BART GORDON, TENNESSEE
CHAIRMAN

RALPH M. HALL, TEXAS
RANKING MEMBER

U.S. HOUSE OF REPRESENTATIVES

COMMITTEE ON SCIENCE AND TECHNOLOGY

SUITE 2320 RAYBURN HOUSE OFFICE BUILDING
WASHINGTON, DC 20515–6301
(202) 225–6375
TTY: (202) 226–4410
http://science.house.gov

October 19, 2007

Dr. Michael Griffin
Administrator
National Aeronautics and Space Administration
300 E St., N.W.
Washington, D.C. 20007

Dear Administrator Griffin:

More than four years ago, the National Aeronautics and Space Administration (NASA) contracted with Battelle Memorial Institute to conduct surveys of 8,000 aviation pilots concerning safety events that they had experienced. The purpose of the surveys was to "provide reliable safety data for improving aviation safety." The pilots were told that their participation would "further improve safety for you, your colleagues, and the aviation public" (Undated "Introductory Letter" to participants from Mary M. Connors and Linda J. Connell, project co-managers).

The survey appears to have been part of the much larger Aviation System Monitoring and Modeling Project, which was to anticipate threats to safety and manage risk in the aviation world. The first step in the project was to monitor the system continuously and collect, codify, and classify safety incident data into repositories that can then be analyzed for insights into aviation safety.

One of the monitoring tools was the National Aviation System Operational Monitoring Service (NAOMS), a comprehensive and coherent survey of the operators of the aviation system (i.e., its pilots, controllers, mechanics, dispatchers, flight attendants, and others) on a regular basis. According to a description written by two employees of NASA's Ames Research Center, "There is proven value in viewing the aviation system through the eyes of its operators. NAOMS is a longitudinal survey that will track safety trends, monitor the impact of technological and procedural changes to the NAS [national aviation system], and contribute to the development of a data-driven basis for safety."[1]

NASA spent millions of dollars over three years to contact 24,000 pilots seeking responses to the survey. Your researchers told Subcommittee staff that the response rate was approximately 80 percent. NASA apparently cancelled the survey many years short

[1] Irving C. Statler and David A. Maluf, "Aviation System Monitoring and Modeling Project," 2003-01-2975. It appears that surveys of other airline employees were not were funded.

of completion, however, without compiling or analyzing the results. NASA also apparently cancelled plans to conduct similar surveys of ground crews, attendants, controllers and others concerning their experience on safety issues. NASA's stated reason for canceling the surveys and not analyzing the data already collected was that NASA did not have the necessary funds. Aviation safety should not be a luxury for NASA pursued only when funds are abundant; one of NASA's primary missions as established by statute is to improve the "safety and efficiency of aeronautical . . . vehicles" (Sec. 102(d)(2) of the National Aeronautics and Space Act). The data appears to have great value to aviation safety, but not on a shelf at NASA, apparently unread since December, 2004

When another party requested the survey material under the Freedom of Information Act (FOIA), NASA denied the request, claiming that it was "commercial" information, and that **"release of the requested data, which are sensitive and safety-related, could materially affect the public confidence in, and the commercial welfare of, the air carriers and general aviation companies whose pilots participated in the survey"** (Letter dated Sept. 5, 2007 from Thomas S. Luedtke to Adam J. Rappaport; emphasis added). That stated reason does not appear to fall within any of the exceptions under FOIA to the requirement to release requested information.

Your attorneys told Subcommittee staff that there were a number of other reasons for not releasing the raw data, including confidentiality promised to the surveyed pilots. That stated reason is still less persuasive. All personal identifiers have been stripped from the data, and, in their communication, Ms. Connors and Ms. Connell promised only that a pilot's answers would "never be connected" to his or her name (Undated letter, *supra).* Additionally, a smaller self-reported aviation incident database is described in NASA's own web site as a "public repository."[2]

In addition to being outside of the recognized exception to FOIA, the reasons NASA has given for not releasing the data appears contrary to NASA's mission. The "safety and efficiency of aeronautical...vehicles" is part of NASA's mission; protecting airlines from public concern about safety is not. If NASA has information about questionable safety practices of airlines, airports, the Federal Aviation Administration, pilots or anyone else, you should have analyzed it promptly and made appropriate recommendations, or you should release the information so the public can make their own judgment about aviation safety.

Now, almost three years after the last survey was conducted, NASA researchers say they want to analyze the data and release their findings in a report after all. The new source of funds for the analysis is not NASA's and staff now voices a strong desire to prepare a draft report by the end of December. NASA would then review the report, especially if the report includes recommendations for improving flight safety in commercial aviation. The process of review will undoubtedly add many more months to the process of delivering a product to the public.

---

[2] "Aviation Safety Reporting System (ASRS), http://human-factors.arc.nasa.gov/awards_pubs/factsheet_view.php?factsheet_id=37

Moreover, NASA's stated reasons for not releasing the information suggests NASA places a higher priority on the commercial interests of the aviation industry than on public safety, which gives rise to questions about how NASA will analyze and present the data.

To help the Subcommittee understand more clearly what information NASA collected in the three years that it surveyed pilots in the NAOMS project, I hereby request that you provide the Subcommittee with a copy of the questionnaire that was used for the pilots as part of the Battelle survey. If there is more than one iteration of that survey, please provide a sample of each. Please provide that document(s) to the Subcommittee offices in B-374 Rayburn House Office Building by 5 p.m. on Tuesday, October 23, 2007.

Please also provide any copies of briefings or presentation materials that the staff at Ames gave to the Airline Pilots Association or other constituent members of the Commercial Aviation Safety Team (CAST) since January 1, 2005. These materials should be delivered to the Subcommittee offices in B-374 Rayburn House Office Building by 5 p.m. on Tuesday, November 6, 2007.

Finally, please provide a written explanation of the budget decision to terminate support for the NAOMS project. All materials on this matter reviewed by the Subcommittee suggest that NAOMS was a very worthwhile initiative that held the promise of a more comprehensive approach to assessing emerging safety issues for the flying public than anything else we have in place. Explain what factors led to canceling the support of NAOMS and where the funds that would have gone to NAOMS went instead. Please provide that written response to the Subcommittee by Tuesday, November 6, 2007.

I expect that we will ask for more information once we have received those documents.

If your staff has any questions or need additional information, please contact Dan Pearson, Subcommittee staff director, at (202) 225-4494, or Edith Holleman, Subcommittee counsel, at (202) 225-8459.

Your prompt attention to this matter is greatly appreciated.

Sincerely,

Brad Ellis

BRAD MILLER
Chairman,
Subcommittee on Investigations and
Oversight

National Aeronautics and
Space Administration
Headquarters
Washington, DC 20546-0001

October 22, 2007

Reply to Attn of: OLIA
OLA/2007-00882:KS:amb

The Honorable Brad Miller
Chairman
Subcommittee on Investigation
and Oversight
Committee on Science and Technology
U.S. House of Representatives
Washington, DC 20515

Dear Mr. Chairman:

This is to acknowledge receipt of your letter of October 19, 2007, regarding NASA's response to a FOIA request concerning the National Aviation Operations Monitoring Service (NAOMS). In the letter, you request a copy of the questionnaire used for pilots as part of the NAOMS survey, copies of briefings or presentation materials, and a written explanation of the budget decision to terminate NASA's support for the NAOMS project.

As requested in your letter, we are transmitting herewith questionnaires in the NAOMS air carrier pilot survey. There are two sets of questionnaires, one for commercial pilots, consisting of four parts, and one for general aviation pilots, consisting of five parts.

We will endeavor to transmit the balance of the materials requested in your October 19 letter by October 29, 2007, as you have requested.

Sincerely,

William W. Bruner, III
Assistant Administrator
for Legislative and Intergovernmental Affairs

2 Enclosures

Oct. 22, 2007

SUBJECT: National Aviation Operational Monitoring Service (NAOMS)

- **What NAOMS Was**

The National Aviation Operational Monitoring Service (NAOMS) was a NASA-funded research effort to demonstrate reliable technology to provide safety decision-makers with tools to make more informed decisions. The concept development of what would become NAOMS began in 1998-2000. In April 2001 through December 2004, data were collected of airline pilots to support the NAOMS tool evaluation. In 2005, the documentation of NAOMS, as well as the transition of the NAOMS to decision-makers in the industry was begun, with both the Commercial Aviation Safety Team (CAST) and the Air Line Pilots' Association (ALPA). The NAOMS technical report took longer than anticipated, and is expected to be complete by the end of this year.

- **Timeline and Budget**

NASA's Aerospace Technology Enterprise funded the NOAMS project from FY98 to FY06 (see below). The last two years funding was provided to complete the project to transition the research methodologies to the Air Line Pilots Association (ALPA) and the Commercial Aviation Safety Team (CAST). NASA has completed the transition and is now writing the technical report evaluating the merits of the methodology.

NAOMS FUNDING LEVELS

FY'98	$0.5M *	FY'03	$1.8M
FY'99	$0.5M *	FY'04	$1.2M
FY'00	$0.8M	FY'05	$0.5M
FY'01	$1.1M	FY'06	$0.6M
FY'02	$1.5M		

* Approximate. Actual numbers unavailable.

- **Reasons NASA ended the NAOMS program**

NAOMS completed its research objectives and reached its planned conclusion. The project's research methodologies have been transitioned to the Air Line Pilots Association (ALPA) and the Commercial Aviation Safety Team (CAST), and NASA is now writing the project's ending documentation.

- **No data has been destroyed.**

Master copies of survey results data retained by Battelle in Mountain View, California, and copies at NASA Ames Research Center. Battelle has provided the following statement:

> *All-*
>
> *The purpose of this email is to affirm, at NASA request, that NASA has never directed Battelle to destroy the master copies of NAOMS survey results data nor has Battelle taken such action. Master copies of all NAOMS survey results are maintained by Battelle in Mountain View, CA on CDs and other backup media. Copies of the CDs have also been conveyed to NASA Ames.*
>
> *NASA has directed Battelle to recover, or ensure the secure destruction, of any secondary copies of the NAOMS data that might be held at locations outside of Mountain View. This includes any copies held by present or past Battelle NAOMS subcontractors. The purpose of this latter action is to ensure that NAOMS conforms to NASA data security requirements. The essential goal is to bring all NAOMS data to a single, secure location managed by NASA. Battelle is in the process of taking this action now as part of the ASMM contract phase-out process. (NAOMS project work has been accomplished under the ASMM contract.)*
>
> *-Loren Rosenthal*
> *Battelle ASMM Program Manager*

- **NASA's plans for the Survey Data**

NASA collected data to support and substantiate the demonstration of the survey methodology. NASA never intended to disseminate the actual data. A final technical report evaluating the merits of the methodology is currently being written and is scheduled to be completed by year's end.

NASA has transitioned the NAOMS research methodology to the Air Line Pilots Association (ALPA) and the Commercial Aviation Safety Team (CAST). NASA is now writing the technical report evaluating the merits of the methodology. The report will be made public when it is finalized.

- **This was a NASA-funded project and there was no funding from any other agency or organization in addition to NASA.**

BART GORDON, TENNESSEE
CHAIRMAN

RALPH M. HALL, TEXAS
RANKING MEMBER

U.S. HOUSE OF REPRESENTATIVES

COMMITTEE ON SCIENCE AND TECHNOLOGY

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October 22, 2007

Dr. Michael Griffin
Administrator
National Aeronautics and Space Administration
300 E St., N.W.
Washington, D.C. 20007

Dear Administrator Griffin,

Recently, the Committee had launched an investigation into aviation safety programs at the National Aeronautics and Space Administration (NASA). Early last week, Committee investigative staff had a telephone conversation with NASA staff concerning a survey of airline pilots about safety incidents conducted under the National Aviation System Operational Monitoring Service (NAOMS). The Committee followed up with a letter requesting certain documents and other information. Therefore, we were surprised to read in the media today that, after that phone conference, NASA officials had directed the lead contractor at Ames Research Center for the NAOMS survey to archive all its materials on this project, return the archived material to NASA and then purge it from their computers and files ("NASA Sits on Air Safety Survey," *Associated Press,* Oct. 22, 2007).

By this letter, we are directing NASA to halt any destruction of records relating to the NAOMS project, whether in the possession of the agency or its contractors, and as defined in the attached Appendix. Destruction of documents requested as part of a Congressional inquiry is a violation of criminal federal law. 18 U.S.C. 1505.

As I am sure you know, this is not the first time this year that we have written regarding a report that NASA was involved in the destruction of materials. In that prior instance, your own General Counsel destroyed video records of your appearance before the staff of the Inspector General. The evidence of misconduct was so clear that the Chairman and Ranking Member of the Investigations and Oversight Subcommittee sent a bipartisan referral letter to the Department of Justice seeking the prosecution of your General Counsel.

We want to prevent any repeat performance with data and records generated as part of the NAOMS process. In a September 5 letter denying a press request under the Freedom of Information Act for the data generated through NAOMS interviews with commercial pilots, Associate Administrator Thomas Luedtke indicated that the data would not be released because it is "sensitive and safety-related, [and] could materially affect the public confidence in, and the commercial welfare of, the air carriers and general aviation companies whose pilots participated in the survey." Given the inference from that response that at NASA commercial interests appear to trump the public's right to aviation safety data, we are worried that the integrity of the data from NAOMS may be at risk. We expect to receive your immediate commitment that the relevant NASA contractors and subcontractors will be given clear, unequivocal guidance not to purge their records. Further, we expect your commitment that the records in NASA's possession will not be destroyed or otherwise compromised.

The Committee intends to hold a hearing on this matter at the earliest possible date. Therefore we ask that you accelerate the production of materials requested in the letter sent on October 19. Please deliver records related to any briefings or presentations given by Ames Research Center researchers and an answer to the question of why funding for NAOMS was cut (both of these elements are described more fully in the October 19 letter) no later than 5 p.m. Monday, October 29, 2007.

Further, we ask that you provide all records related to the guidance to your prime contractor, Battelle Memorial Institute, that it archive records, return them to NASA and then purge their own holdings on NAOMS. Please provide these materials no later than 5 p.m. Monday, October 29, 2007.

NASA has made repeated representations, to Committee staff in interviews as well as in the FOIA denial letter signed by Mr. Luedtke, that the material interests of the commercial airline industry may be harmed by release of data developed under NAOMS. Please provide to the Committee any records in the possession of the agency from the commercial airline industry (carriers or representative organizations) in which the concern that NAOMS data may affect their commercial interests was communicated to NASA. Please provide those records to the Committee no later than 5 p.m. Tuesday, November 6, 2007.

Finally, we ask that you make a copy of all NAOMS data resulting from the pilots survey and in the possession of either NASA or Batellee and deliver it to the Committee in an electronic format. As we wish to insure that an unadulterated record of that data be retained, we request the raw data files that the researchers at Ames are supposed to be working from to produce their analysis of the pilot survey. Please provide those records to the Committee no later than 5 p.m. Tuesday, November 6, 2007.

All of the requested materials should be delivered to the offices of the Committee in B-374 Rayburn House Office Building. Please provide two copies (one for the majority and one for the minority). If your staff has any further questions or need additional information, please contact Dan Pearson, Investigations and Oversight Subcommittee staff director, at (202) 225-4494, or Edith Holleman, Investigative Counsel, at (202) 225-8459.

Sincerely,

BART GORDON
Chairman

BRAD MILLER
Chairman
Subcommittee on
Investigations & Oversight

MARK UDALL
Chairman
Subcommittee on Space &
Aeronautics

Cc:

Rep. Ralph Hall
Ranking Member

Rep. F. James Sensenbrenner
Ranking Member
Subcommittee on Investigations& Oversight

Rep. Tom Feeney
Ranking Member
Subcommittee on Space & Aeronautics

ATTACHMENT

1. The term "records" is to be construed in the broadest sense and shall mean any written or graphic material, however produced or reproduced, of any kind or description, consisting of the original and any non-identical copy (whether different from the original because of notes made on or attached to such copy or otherwise) and drafts and both sides thereof, whether printed or recorded electronically or magnetically or stored in any type of data bank, including, but not limited to, the following: correspondence, memoranda, records, summaries of personal conversations or interviews, minutes or records of meetings or conferences, opinions or reports of consultants, projections, statistical statements, drafts, contracts, agreements, purchase orders, invoices, confirmations, telegraphs, telexes, agendas, books, notes, pamphlets, periodicals, reports, studies, evaluations, opinions, logs, diaries, desk calendars, appointment books, tape recordings, video recordings, e-mails, voice mails, computer tapes, or other computer stored matter, magnetic tapes, microfilm, microfiche, punch cards, all other records kept by electronic, photographic, or mechanical means, charts, photographs, notebooks, drawings, plans, inter-office communications, intra-office and intra-departmental communications, transcripts, checks and canceled checks, bank statements, ledgers, books, records or statements of accounts, and papers and things similar to any of the foregoing, however denominated.

2. The terms "relating," "relate," or "regarding" as to any given subject means anything that constitutes, contains, embodies, identifies, deals with, or is in any manner whatsoever pertinent to that subject, including but not limited to records concerning the preparation of other records.

National Aeronautics and
Space Administration
Office of the Administrator
Washington, DC 20546-0001

October 29, 2007

The Honorable Bart Gordon
Chairman
Committee on Science and Technology
U.S. House of Representatives
Washington, DC 20515

Dear Mr. Chairman:

This is in further response to the letter of October 19, 2007, from Chairman Miller, and your letter of October 22, 2007, signed jointly with Chairman Udall and Chairman Miller, regarding the National Aviation Operations Monitoring Service (NAOMS) and requesting several items be provided to the Committee. We have previously provided Chairman Miller copies of the questionnaires used for pilots as part of the NAOMS survey, as requested in the first letter. Enclosed herewith is the remainder of the material requested in both letters.

As requested in the letter of October 19, enclosed is a CD with copies of "briefings or presentation materials that the staff at Ames gave to the Airline Pilots Association or other constituent members of the Commercial Aviation Safety Team (CAST) since January 1, 2005." (Copies also previously given to Investigations and Oversight Subcommittee staff).

The letter of October 22 requested several additional pieces of information:

- "All records related to the guidance to your prime contractor, Battelle Memorial Institute, that it archive records, return them to NASA and then purge their own holdings on NAOMS." Enclosed are:
  - Documents relevant to the contract provisions that deal with records archival and retention:
    - contract signature page (Enclosure 1);
    - sections H. 5, H. 6 and H. 10 of the contract (Enclosure 2);
    - section I.1, which incorporates the Federal Acquisition Regulations clause regarding rights in data (Enclosure 3);
    - contract task order 2, modification 4 (Enclosure 4); and
    - contract task order 11 (Enclosure 5);
  - A copy of the memorandum from Battelle to its subcontractors regarding the records retention policy (Enclosure 6);

- A copy of instructions from the NASA General Counsel regarding preservation of data (Enclosure 7);
- A copy of an e-mail from the Battelle Aviation Safety Monitoring and M Modeling Program Manager affirming that NASA has never directed Battelle to destroy the master copies of NAOMS survey results (Enclosure 8).

- Any records "from the commercial airline industry (carriers or representative organizations) in which the concern that NAOMS data may affect their commercial interests was communicated to NASA."
  - We have not found any documents responsive to this request.

- A "copy of all NAOMS data resulting from the pilots survey and in the possession of either NASA or Battelle...in electronic format."
  - Enclosed are four CDs: Air Carrier Data April 2001 through December 2004; Air Carrier Data Joint Implementation Measurement Data Analysis Team (JIMDAT) Section C Supplement, April 2001 through December 2004; General Aviation Data, August 2002 through April 2003; and NAOMS Raw Data Air Carrier including Field Trial.

This data is in the process of being reviewed by NASA. NASA believes that the data contains both confidential commercial data and information that could compromise anonymity that should be redacted prior to public release.

The raw data file is defined as the original capture of survey participants' responses to a series of questions without any evaluation of the validity of the data points to determine if there are input errors, duplicate responses, or if the participants' responses are outside of operationally possible levels, etc. These types of errors are considered as outliers and are typically omitted from final data analyses after comprehensive statistical evaluation and assessment. As such, if any data analysis is done without considering this routine scientific step, the results could potentially be over or under representations of actual valid data. Therefore, the processed data that have these "outliers" removed have also been provided for air carrier, general aviation and JIMDAT data sets.

To ensure that no destruction of data, including that held by sub-contractors, occurred, NASA has since notified the NAOMS project management team and Battelle to retain all records related to the NAOMS project. Battelle has provided the same direction to its subcontractors.

The letter of October 19 also requested "a written explanation of the budget decision to terminate support for the NAOMS project." It has been widely reported that NAOMS funding was cut or prematurely shut down. That is not the case. When the project originated in 1998, it was intended to continue until 2004, as indicated in project briefings that were provided to various Government and industry audiences when the project began. (As mentioned above, copies of these briefings are enclosed. Later

briefings indicated an extension to 2005.) Funding was extended through 2006 to allow for transition of the methodology and final documentation.

However, the overarching goal of trying to develop methodologies that enable data-driven system safety analyses is one that NASA continues to embrace in its current Aviation Safety Program, in close partnership with the FAA, industry, and academia. In order to continually and significantly reduce the accident rate to meet the expected growth of the Next Generation Air Transportation System (NextGen), it is imperative to develop a robust safety information system that discovers safety precursors before accidents occur. Accomplishing this will require the ability to combine and analyze vast amounts of data from many varied sources to detect and act on new safety threats.

NASA and the FAA are combining their unique skills and resources under clearly defined roles and responsibilities to address this challenge. In order to ensure that the technology is effectively transitioned between organizations, a program plan has been developed and is being executed. The initial response to this approach from the stakeholder community has been very positive.

I believe this material is fully responsive to your requests. I would be happy to discuss this matter further as desired at your convenience.

Sincerely,

Michael D. Griffin
Administrator

Enclosures

cc:

The Honorable Ralph Hall

SCANNED DATE 11-5-04 TG820600

OMB Approved 3150-0045

AWARD/CONTRACT	1. THIS CONTRACT IS A RATED ORDER UNDER DPAS (15 CFR 700)	RATING	PAGE	OF	PAGES
		DO-C9	1		53

2. CONTRACT (Proc. Inst. Ident.) NO.	3. EFFECTIVE DATE	4. REQUISITION/PURCHASE REQUEST/PROJECT NO.
NNA05AC07C	November 7, 2004	4200080770

5. ISSUED BY	CODE	6. ADMINISTERED BY (If other than Item 5)	CODE
NASA Ames Research Center Acquisition Division, M/S 241-1 Moffett Field, CA 94035-1000	JAI: 241-1		

7. NAME AND ADDRESS OF CONTRACTOR (No., street, county, state and ZIP Code)	8. DELIVERY
Battelle Memorial Institute 505 King Avenue Columbus, OH 43201-2693 Telephone No.: (614) 424-7092	☐ FOB ORIGIN ☒ OTHER (See below)
	9. DISCOUNT FOR PROMPT PAYMENT NET – 30 Days 0% - 0 Days
	10. SUBMIT INVOICES (4 copies unless otherwise specified) TO THE ADDRESS SHOWN IN: ITEM 12

CODE	CAGE CODE:	FACILITY CODE

11. SHIP TO/MARK FOR	CODE	DU268-3	12. PAYMENT WILL BE MADE BY	CODE	CFS: 203-18
See Section F			NASA Ames Research Center Accounting Operations Branch, M/S 203-18 Moffett Field, CA 94035-1000 650/604-5315		

13. AUTHORITY FOR USING OTHER FULL AND OPEN COMPETITION:	14. ACCOUNTING AND APPROPRIATION DATA
☒ 10 U.S.C. 2304(c)(2) ☐ 41 U.S.C. 253(c)( )	PR 4200080770 [redacted] PPC: WO

15A. ITEM NO.	15B. SUPPLIES/SERVICES	15C. QUANTITY	15D. UNIT	15E. UNIT PRICE	15F. AMOUNT
01	Research and Development of Tools and Methodologies for Aviation System Monitoring and Modeling (ASMM) Section K, dated October 25, 2004 submitted in response to NNA04080770R is hereby incorporated and made part of this contract.	1	JB	[redacted]	[redacted]

Type of Contract: Cost-Plus-Fixed Fee Contract — 15G. TOTAL AMOUNT [redacted]

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CONTRACTING OFFICER WILL COMPLETE ITEM 17 OR 18 AS APPLICABLE

17. ☒ CONTRACTOR'S NEGOTIATED AGREEMENT *(Contractor is required to sign this document and return 1 copies to issuing office.)* Contractor agrees to furnish and deliver all items or perform all the services set forth or otherwise identified above and on any continuation sheets for the consideration stated herein. The rights and obligations of the parties to this contract shall be subject to and governed by the following documents: (a) this award/contract, (b) the solicitation, if any, and (c) such provisions, representations, certifications, and specifications, as are attached or incorporated by reference herein. *(Attachments are listed herein.)*

18. ☐ AWARD *(Contractor is not required to sign this document.)* Your offer on Solicitation Number _____, including the additions or changes made by you which additions or changes are set forth in full above, is hereby accepted as to the items listed above and on any continuation sheets. This award consummates the contract which consists of the following documents: (a) the Government's solicitation and your offer, and (b) this award/contract. No further contractual document is necessary.

19A. NAME AND TITLE OF SIGNER (Type or print)	20A. NAME OF CONTRACTING OFFICER
GLORIA L. MILLER CONTRACTING OFFICER	Jill Willard Contracting Officer

19B. NAME OF CONTRACTOR	19C. DATE SIGNED	20B. UNITED STATES OF AMERICA	20C. DATE SIGNED
Gloria L. Miller (Signature of person authorized to sign)	11/5/04	BY Jill Willard (Signature of Contracting Officer)	11/5/04

NSN 7540-01-152-8069 PREVIOUS EDITION UNUSABLE — 26-107 Computer Generated — STANDARD FORM 26 (REV. 4-85) Prescribed by GSA FAR (48 CFR) 53.214(a)

TOTAL P.02

11/04/2004 22:16 6506044377 PAGE 02

ENCLOSURE 1

H.5. MANAGEMENT AND PROTECTION OF DATA (ARC 52.227-93) (JUL 1988)

(a) In the performance of this contract it is anticipated that the Contractor may have access to, be furnished, use, or generate the following types of data (recorded information):

(1) data submitted to the Government with limited rights or restricted rights notices;

(2) data of third parties which the Government has agreed to handle under protective arrangements; and

(3) data generated by or on behalf of the Government, which the Government intends to control the use and dissemination thereof.

(b) In order to provide management appropriate for protecting the interests of the Government and other owners of such data, the Contractor agrees with respect to data in category (a)(1) above, and with respect to any data in categories (a)(2) and (a)(3) when so identified by the Contracting Officer, to:

(1) use and disclose such data only to the extent necessary to perform the work required under this contract, with particular emphasis on restricting disclosure of the data to those persons who have a definite need for the data in order to perform under this contract;

(2) not reproduce the data unless reproduction of the data is specifically permitted elsewhere in the contract or by the Contracting Officer;

(3) refrain from disclosing the data to third parties without the written consent of the Contracting Officer; and

(4) return or deliver the data including all copies thereof to the Contracting Officer or his designated recipient when requested by the Contracting Officer.

(END OF CLAUSE)

H.6. HANDLING OF DATA (ARC 52.227-96) (JUN 1989)

(a) Paragraph (d)(1) of the "Rights in Data--General" clause of this contract permits the Government to restrict the Contractor's right to use, release to others, reproduce, distribute, or publish any data first produced or specifically used by the Contractor in the performance of the contract provided such restriction is expressly set forth in the contract. Pursuant to this authority, the following restrictions shall apply to such data and shall be included, in substance, in all subcontracts:

(b) Data specifically used.

(1) In the performance of this contract, it is anticipated the Contractor may have access, or be furnished, data (including financial, administrative, cost or pricing, or management

ENCLOSURE 2

information as well as technical data or computer software) of third parties which the Government has agreed to handle under protective arrangements, as well as such Government data for which the Government intends to control the use and dissemination.

(2) In order to protect the interests of the Government and the owners of such data, the Contractor agrees, with respect to such third party or Government data that is either marked with a restrictive legend or specifically identified in this contract or in writing by the Contracting Officer as being subject to this clause, to use and disclose such data only to the extent necessary to perform the work required under this contract, preclude disclosure of such data outside the Contractor's organization, and return or dispose of such data as directed by the Contracting Officer when the data is no longer needed for contract performance.

(3) Notwithstanding (2) above, the Contractor shall not be restricted in the use and disclosure of any data that becomes generally available without breach of this clause by this Contractor, is known to or is developed by the Contractor independently of any disclosure of proprietary, restricted, or confidential data hereunder, or is rightfully received by the Contractor from a third party without restriction.

(c) Data first produced.

Data first produced by the Contractor under this contract may include data for which the Government wants to control the use and dissemination. The Contracting Officer may require, or this contract may presently specify, that the Contractor apply restrictive legends to such identified data prior to delivery to the Government, or to third parties at the Government's direction, that restrict the use and disclosure of the data by any third party recipient. However, such restrictive legends shall in no way affect the Contractor's or the Government's rights to such data as provided in the "Rights in Data--General" clause of this contract.

(END OF CLAUSE)

H.7. SEVERANCE PAY (ARC 52.231-90) (MAY 1993)

In conjunction with FAR 31.205-6(g), the severance pay cost shall not exceed 40 hours pay for each year of employment per employee up to a maximum of 80 hours per eligible employee. Severance cost eligibility computation for reimbursement shall also be limited to only the period of employment on the service contract at Ames Research Center. In no event shall the Government reimburse the Contractor for severance cost for employees who voluntarily accept employment in place with the succeeding contractor within ninety (90) days after completion of the current contract.

(END OF CLAUSE)

H.8. SUBCONTRACTING, DATA NOT FIRST PRODUCED UNDER THE CONTRACT AND REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED RIGHTS SOFTWARE (ARC 52.227-97) (OCT 2004)

It is strongly recommended that the Contractor flow down the data rights provisions of this contract to lower tier subcontractors to ensure that it can fulfill its data rights obligations to the Government. See Clause FAR 52.227-14(h), *Rights in Data—General*. The Contractor shall be held responsible to obtain rights for the Government where it fails to fulfill such obligations.

Offerors are reminded that as required by Clause FAR 52.227-14(c)(2), the Contractor must obtain Contracting Officer approval before incorporating any data not first produced under the Contract into data delivered under the contract. Before delivering such data, the Contractor must identify it and grant the Government, or acquire on its behalf, the broad licenses required by subparagraph (c) of the *Rights in Data—General* clause.

The Contractor shall make the representation required by FAR 52.227-15 for each contract task order. On a case-by-case basis, the Government will insert the purposes, rights or limitations under which the Government can use Limited Rights Data and Restricted Rights Software into the alternate clauses II and III of FAR 52.227-14.

(END OF CLAUSE)

H.9. INFORMATION INCIDENTAL TO CONTRACT ADMINISTRATION (ARC 52.227-98) (OCT 2004)

NASA shall have unlimited rights in information incidental to contract administration including administrative and management information created by the Contractor and specified for delivery to NASA in performance of the contract, expressly excluding financial information. Specifically, NASA shall have the right to release such administrative and management information to any third party to satisfy NASA's requirements.

(END OF CLAUSE)

H.10 DATA RIGHTS—HANDLING OF DATA/MANAGEMENT & PROTECTION OF DATA & SPECIAL WORKS

The Contractor is hereby instructed that the categories of data identified below are subject to the non-disclosure, handling and other required obligations of ARC 52.227-93 (Management and Protection of Data)(Clause H.5) and ARC 52.227-96 (Handling of Data)(Clause H.6) of the contract.

Please review the requirements of these clauses which include the following obligations:

(1) use and disclose such data only to the extent necessary to perform the work required under this contract, with particular emphasis on restricting disclosure of the data to those persons who have a definite need for the data in order to perform under this contract;

(2) the Contractor agrees, with respect to such third party or Government data that is either marked with a restrictive legend or specifically identified in this contract or in writing by the Contracting Officer as being subject to this clause, to use and disclose such data only to the extent necessary to perform the work required under this contract, preclude disclosure outside the Contractor's organization, and return of such data as directed by the Contracting Officer when the data is no longer needed for contract performance.

Categories of data identified under this contract:

Any flight recorded data from FOQA programs

Any radar data from PDARS programs

Any safety report data from Aviation Safety Action Programs

The Contractor is hereby directed to assert copyright, or authorize assertion thereof, in special works data and to assign, or obtain the assignment of, such copyright to the Government or its designated assignee in accordance with Clause 52.227-17 Rights in Data-Special Works. The direction applies to software extensions of Morning Report to air traffic control data and distributed national FOQA archive software.

(END OF CLAUSE)

(END OF SECTION)

PART II - CONTRACT CLAUSES

SECTION I - CONTRACT CLAUSES

I.1. LISTING OF CLAUSES INCORPORATED BY REFERENCE

NOTICE: This contract incorporates one or more clauses by reference, with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available. Also, the full text of a clause may be accessed electronically at this/these address(es):

http://www.arnet.gov/far/

http://www.hq.nasa.gov/office/procurement/regs/nfstoc.htm

http://procure.arc.nasa.gov/Acg/Center-Clauses/Index.html

I. FEDERAL ACQUISITION REGULATION (48 CFR CHAPTER 1)

CLAUSE NUMBER	DATE	TITLE
52.202-1	JUL 2004	DEFINITIONS
52.203-3	APR 1984	GRATUITIES
52.203-5	APR 1984	COVENANT AGAINST CONTINGENT FEES
52.203-6	JUL 1995	RESTRICTIONS ON SUBCONTRACTOR SALES TO THE GOVERNMENT
52.203-7	JUL 1995	ANTI-KICKBACK PROCEDURES
52.203-8	JAN 1997	CANCELLATION, RESCISSION AND RECOVERY OF FUNDS FOR ILLEGAL OR IMPROPER ACTIVITY
52.203-10	JAN 1997	PRICE OR FEE ADJUSTMENT FOR ILLEGAL OR IMPROPER ACTIVITY
52.203-12	JUN 2003	LIMITATION ON PAYMENTS TO INFLUENCE CERTAIN FEDERAL TRANSACTIONS
52.204-4	AUG 2000	PRINTED OR COPIED DOUBLE-SIDED ON RECYCLED PAPER
52.204-7	OCT 2003	CENTRAL CONTRACTOR REGISTRATION
52.209-6	JUL 1995	PROTECTING THE GOVERNMENT'S INTEREST WHEN SUBCONTRACTING WITH CONTRACTORS DEBARRED, SUSPENDED, OR PROPOSED FOR DEBARMENT
52.211-5	AUG 2000	MATERIAL REQUIREMENTS
52.211-15	SEP 1990	DEFENSE PRIORITY AND ALLOCATION

ENCLOSURE 3

		REQUIREMENTS
52.215-2	JUN 1999	AUDIT AND RECORDS -- NEGOTIATION
52.215-8	OCT 1997	ORDER OF PRECEDENCE - UNIFORM CONTRACT FORMAT
52.215-10	OCT 1997	PRICE REDUCTION FOR DEFECTIVE COST OR PRICING DATA
52.215-11	OCT 1997	PRICE REDUCTION FOR DEFECTIVE COST OR PRICING DATA -- MODIFICATIONS
52.215-12	OCT 1997	SUBCONTRACTOR COST OR PRICING DATA
52.215-13	OCT 1997	SUBCONTRACTOR COST OR PRICING DATA- MODIFICATIONS
52.215-15	JAN 2004	PENSION ADJUSTMENTS AND ASSET REVERSIONS
52.215-18	OCT 1997	REVERSION OR ADJUSTMENT OF PLANS FOR POSTRETIREMENT BENEFITS (PRB) OTHER THAN PENSIONS
52.215-19	OCT 1997	NOTIFICATION OF OWNERSHIP CHANGES
52.216-7	DEC 2002	ALLOWABLE COST AND PAYMENT Insert "30 days" in Paragraph (a)(3)
52.216-8	MAR 1997	FIXED FEE
52.217-8	NOV 1999	OPTION TO EXTEND SERVICES
52.219-8	OCT 2000	UTILIZATION OF SMALL BUSINESS CONCERNS
52.219-9	JAN 2002	SMALL BUSINESS SUBCONTRACTING PLAN (ALT II)(OCT 2001)
52.219-16	JAN 1999	LIQUIDATED DAMAGES – SUBCONTRACTING PLAN
52.222-1	FEB 1997	NOTICE TO THE GOVERNMENT OF LABOR DISPUTES
52.222-2	JUL 1990	PAYMENT FOR OVERTIME PREMIUMS (INSERT: "$0" IN PARAGRAPH (a))
52.222-3	JUN 2003	CONVICT LABOR
52.222-21	FEB 1999	PROHIBITION OF SEGREGATED FACILITIES
52.222-26	APR 2002	EQUAL OPPORTUNITY
52.222-35	DEC 2001	EQUAL OPPORTUNITIES FOR SPECIAL DISABLED VETERANS, VETERANS OF THE VIETNAM ERA AND OTHER SPECIAL VETERANS
52.222-36	JUN 1998	AFFIRMATIVE ACTION FOR WORKERS WITH DISABILITIES
52.222-37	DEC 2001	EMPLOYMENT REPORTS ON SPECIAL DISABLED VETERANS, VETERANS OF THE VIETNAM ERA, AND OTHER ELIGIBLE VETERANS
52.223-6	MAY 2001	DRUG-FREE WORKPLACE
52.223-14	AUG 2003	TOXIC CHEMICAL RELEASE REPORTING
52.225-1	JUN 2003	BUY AMERICAN ACT-SUPPLIES
52.225-13	DEC 2003	RESTRICTIONS ON CERTAIN FOREIGN

		PURCHASES
52.227-1	JUL 1995	AUTHORIZATION AND CONSENT (ALTERNATE I) (APR 1984)
52.227-2	AUG 1996	NOTICE AND ASSISTANCE REGARDING PATENT AND COPYRIGHT INFRINGEMENT
52.227-14	JUN 1987	RIGHT IN DATA – GENERAL (ALT II) (JUN 1987) (ALT III) (JUN 1987)(AS MODIFIED BY NFS 1852.227-14, RIGHTS IN DATA – GENERAL)
52.227-16	JUN 1987	ADDITIONAL DATA REQUIREMENTS
52.227-17	JUN 1987	RIGHTS IN DATA – SPECIAL WORKS (with subparagraph (e) indemnity deleted from this clause)
52.227-19	JUN 1987	COMMERCIAL COMPUTER SOFTWARE - RESTRICTED RIGHTS
52.227-23	JUN 1987	RIGHTS TO PROPOSAL DATA (TECHNICAL) (INSERT: PAGES _____, DATED _____)
52.228-7	MAR 1996	INSURANCE-LIABILITY TO THIRD PERSONS
52.230-2	APR 1998	COST ACCOUNTING STANDARDS
52.230-3	APR 1998	DISCLOSURE AND CONSISTENCY OF COST ACCOUNTING PRACTICES
52.230-6	NOV 1999	ADMINISTRATION OF COST ACCOUNTING STANDARDS
52.232-9	APR 1984	LIMITATION ON WITHHOLDING OF PAYMENTS
52.232-17	JUN 1996	INTEREST
52.232-18	APR 1984	AVAILABILITY OF FUNDS
52.232-20	APR 1984	LIMITATION OF COST
52.232-22	APR 1984	LIMITATION OF FUNDS
52.232-23	JAN 1986	ASSIGNMENT OF CLAIMS
52.232-25	FEB 2002	PROMPT PAYMENT (ALTERNATE I) (FEB 2002)
52.232-34	MAY 1999	PAYMENT BY ELECTRONIC FUNDS TRANSFER- OTHER THAN CENTRAL CONTRACTOR REGISTRATION (Insert: "No later than 15 days prior to submission of the first request for payment" in paragraph (b)(1))
52.233-1	JUL 2002	DISPUTES (ALTERNATE I) (DEC 1991)
52.233-3	AUG 1996	PROTEST AFTER AWARD (ALTERNATE I) (JUN 1985)
52.237-3	JAN 1991	CONTINUITY OF SERVICES
52.239-1	AUG 1996	PRIVACY OR SECURITY SAFEGUARDS
52.242-1	APR 1984	NOTICE OF INTENT TO DISALLOW COSTS
52.242-3	MAY 2001	PENALTIES FOR UNALLOWABLE COSTS
52.242-4	JAN 1997	CERTIFICATION OF FINAL INDIRECT COSTS
52.242-13	JUL 1995	BANKRUPTCY
52.243-2	AUG 1987	CHANGES-COST-REIMBURSEMENT (ALT IV)(APR 1984)

52.244-2	AUG 1998	SUBCONTRACTS (ALT I)(AUG 1998)
52.244-5	DEC 1996	COMPETITION IN SUBCONTRACTING
52.245-1	APR 1984	PROPERTY RECORDS
52.245-5	MAY 2003	GOVERNMENT PROPERTY (COST-REIMBURSEMENT, TIME-AND- MATERIAL, OR LABOR-HOUR CONTRACTS)
52.245-19	APR 1984	GOVERNMENT PROPERTY FURNISHED "AS IS"
52.247-1	APR 1984	COMMERCIAL BILL OF LADING NOTATIONS
52.249-6	SEP 1996	TERMINATION (COST-REIMBURSEMENT)
52.249-14	APR 1984	EXCUSABLE DELAYS
52.251-1	APR 1984	GOVERNMENT SUPPLY SOURCES
52.253-1	JAN 1991	COMPUTER GENERATED FORM/S

II. NASA FAR SUPPLEMENT (48 CFR CHAPTER 18) CLAUSES

CLAUSE NUMBER	DATE	TITLE
1852.203-70	JUN 2001	DISPLAY OF INSPECTOR GENERAL HOTLINE POSTERS
1852.204-76	JUL 2002	SECURITY REQUIREMENTS FOR UNCLASSIFIED INFORMATION TECHNOLOGY RESOURCES (INSERT: "30 DAYS" IN PARAGRAPH (c))
1852.216-75	DEC 1988	PAYMENT OF FIXED FEE
1852.219-74	SEP 1990	USE OF RURAL AREA SMALL BUSINESSES
1852.219-75	MAY 1999	SMALL BUSINESS SUBCONTRACTING REPORTING
1852.219-76	JUL 1997	NASA 8 PERCENT GOAL
1852.227-14	AUG 1997	RIGHTS IN DATA -- GENERAL
1852.227-17	AUG 1997	RIGHTS IN DATA — SPECIAL WORKS
1852.235-70	FEB 2003	CENTER FOR AEROSPACE INFORMATION
1852.245-73	OCT 2003	FINANCIAL REPORTING OF NASA PROPERTY IN THE CUSTODY OF CONTRACTORS (Insert: NASA Ames Research Center, M/S 255-2, Moffett Field, CA 94035-1000)

(END OF CLAUSE)

I.2. OMBUDSMAN (NFS 1852.215-84) (OCT 2003) (ALTERNATE I) (JUN 2000)

(a) An ombudsman has been appointed to hear and facilitate the resolution of concerns from offerors, potential offerors, and contractors during the preaward and postaward

NASA ARC TASK ORDER

Contract No.: NNA05AC07C Contract Title: ASMM

TASK REQUIREMENTS

Task Title: Conversion and Transition of the Air Carrier Survey

Task No.: 2 (NAOMS)	Task Mod. No.: 4	Date: 6-Mar-2007
Task Requester: Mary M. Connors	Extension: 4-6655	Customer Code:

Internal Service Order (SR) No. ☒ No ☐ Yes *If yes, identify:*

Task previously covered by another contract (other than predecessor to incumbent)? ☒ No ☐ Yes *If yes, identify:*

Task requires contractor access to Government database(s)? ☐ No ☒ Yes *If yes, identify and justify access need:* NAOMS

SECTION 508, Electronic and Information Technology Accessibility Compliance (EIT-AC):

☒ This task does not include EIT items OR ☐ This task does include EIT items; ARC 789 or equivalent is attached. (See http://section508.arc.nasa.gov/.)

Upon receipt of this task order request, the contractor shall review the task requirement(s) and inform the Government, as part of its task order/modification response, any discrepancies between standards initially cited and those the contractor proposes to deliver to the Government. Examples of discrepancies include ODCs for which some other standard might be or become applicable and, as a result, require citation in the task order, as well as any cited standards that the contractor believes is not applicable (provide rationale).

NOTE: If, by mischance, the task, including any ODC of the task, should not meet an applicable standard not cited by the requester, it is the requester, not the contractor who is at fault, and, the requester must find a way (e.g., by modifying the task request) to bring the task into compliance. In such cases, the requester shall complete a revised ARC Form 789 (or equivalent) before the task order/modification is approved.

Affirmative Procurement

☒ The item(s) being purchased are NOT on any of the EPA's Comprehensive Procurement Guideline lists. OR

☐ The item(s) are on the EPA's Comprehensive Procurement Guideline lists AND

- ☐ They meet the minimum recycled/recovered content. *Or*
- ☐ A waiver signed by the designated Environmental Program Manager is attached. (See http://www.epa.gov/cpg/products.htm.)

Statement of Requirements/Task Description: The approach, deliverables, and milestone requirements for CTO 2 are presented in earlier versions of this agreement. This current modification to that agreement:

- Adds a deliverables requirement
- Changes deliverable dates
- Does not change any milestone dates
- Increases the estimated cost.

Cost changes are summarized below. Deliverables revisions are summarized in the Continuation block on the following page.

Authorization to proceed required? ☐ No ☐ Yes

☐ Start work NTE (30 day estimate) until task order plan is approved

☐ Do not start work until task order plan is approved.

Technical Performance (0-75%):	
Cost Performance (25-100%):	
Schedule Performance (0-75%):	
COTR	Contracting Officer

TASK ORDER PERFORMANCE/COMPENSATION PERIOD SUMMARY

Performance Period: 4/17/2006 to 4/30/2007

Contractor Task Leader: Daniel Haber

This Request: ☐ Original ☒ Modification

Site/Program Manager: Loren Rosenthal

COTR: Dr. Irving Statler

CATEGORIES	THIS REQUEST TASK ESTIMATE	CUMULATIVE TOTAL TASK ESTIMATE
LABOR HOURS	[redacted]	[redacted]
LABOR (BURDENED)	[redacted]	[redacted]
ODC (BURDENED)	[redacted]	[redacted]
SUBCONTRACTING	[redacted]	[redacted]
INTERORG'L TRANSFERS	[redacted]	[redacted]
AWARD FEE	[redacted]	[redacted]
TOTAL:	[redacted]	[redacted]

Comments:

Irving C. Statler for Mary Connors Task Requester		Irving C. Statler COTR
[signature] Site/Program Manager		Jill Willard Contracting Officer

Previous editions are obsolete

JA 036 (Mar 2006)

ENCLOSURE 4

NASA ARC TASK ORDER

Contract No.: NNA05AC07C		Contract Title: ASMM		
Task No.: 2	Task Mod. No.: 4	Task Title: Conversion and Transition of the Air Carrier Survey		
2. SUPPLEMENTAL TASK ORDER INFORMATION				
Final Cost	Date Completed	Site/Program Manager	Task Requester	COTR

3. TASK ORDER CONTENT

Statement of Requirements/Task Description:

Deliverables	Original Date	New Date	Comment
Packaged NAOMS Data Set (air carrier)	31-May-2006	19-Jan-2007	Done
Packaged NAOMS Data Set (GA)	31-May-2006	29-Sep-2006	Done
CAM Application (initial)	31-May-2006	31-May-2006	Done
CAM Application (final)	31-Jul-2006	24-Jan-2007	Done
Web-based Experiment Report	31-Jul-2006	23-Mar-2006	Done
NAOMS Procedures Manual	30-Sep-2006	31-Jan-2007	Done
Written Guidance on Achieving System-level Representativeness	31-Aug-2006	9-Feb-2007	Done
NAOMS Air Carrier Section B Trend Report	n/a	30-Apr-2007	New Deliverable
Ad hoc Analytic Support Responsive to FOIA & Other NASA Requests	n/a	n/a	Ad hoc services without specific deliverables

Comments:

Battelle
The Business of Innovation
505 King Avenue
Columbus, Ohio 43201-2693
(614) 424-6424 Fax (614) 424-5263

September 10, 2007

Battelle Proposal No. OP46959

Ms. Melissalynn Perkins
Contracting Officer
MS 241-1
NASA ARC
Moffett Field, CA 94035-1000

Dear Ms. Perkins:

Battelle Memorial Institute is pleased to submit this proposal to support Contract Number NNA05AC07C, CTO #11, entitled "ASMM Phase Out" under the NASA ASMM program.

This proposal is submitted on a cost plus fixed fee basis for a total estimated cost of $19,832, which includes a fixed fee of $1,136. Battelle will invoice incurred costs on a monthly basis. This proposal is valid for 30 days. Acceptance after that date will be by agreement with Battelle.

Please direct questions of a business or contractual nature to Mr. William E. Jones at (614) 424-7089. Technical questions should be directed to Mr. Loren Rosenthal at (650) 960-6010.

Sincerely,

William E. Jones

William E. Jones
Contracting Officer

WEJ:lsp
Enclosure

ENCLOSURE 5

NASA ARC TASK ORDER

Contract No.: NNA05AC07C	Contract Title: ASMM	
PART I - TASK ORDER REQUEST		
Task Title: ASMM Phase-out		
Task No.: 11	Task Mod. No.: Original	Date: 10-Sep-2007
Task Requester: Irving Statler	Extension: 4-6655	Customer Code:
Internal Service Order (SR) No. ☒ No ☐ Yes *If yes, identify:*		
Task previously covered by another contract (other than predecessor to incumbent)? ☒ No ☐ Yes *If yes, identify:*		
Task requires contractor access to Government database(s)? ☐ No ☒ Yes *If yes, identify and justify access need:* NAOMS		

SECTION 508: Electronic and Information Technology Accessibility Compliance (EITAC):

☒ This task does not include EIT items OR ☐ This task does include EIT items; ARC 789 or equivalent is attached. (See http://section508.arc.nasa.gov/.)

Upon receipt of this task order request, the contractor shall review the task requirement(s) and inform the Government, as part of its task order/modification response, any discrepancies between standards initially cited and those the contractor proposes to deliver to the Government. Examples of discrepancies include ODCs for which some other standard might be or become applicable and, as a result, require citation in the task order, as well as any cited standards that the contractor believes is not applicable (provide rationale).

NOTE: If, by mischance, the task, including any ODC of the task, should not meet an applicable standard not cited by the requester, it is the requester, not the contractor who is at fault, and, the requester must find a way (e.g., by modifying the task request) to bring the task into compliance. In such cases, the requester shall complete a revised ARC Form 789 (or equivalent) before the task order/modification is approved.

Affirmative Procurement

☒ The item(s) being purchased are NOT on any of the EPA's Comprehensive Procurement Guideline lists. OR

☐ The item(s) are on the EPA's Comprehensive Procurement Guideline lists AND

- ☐ They meet the minimum recycled/recovered content. Or
- ☐ A waiver signed by the designated Environmental Program Manager is attached. (See http://www.epa.gov/cpg/products.htm.)

Statement of Requirements/Task Description:

CTO 11 relates to phase-out activities for the ASMM contract. The principal phase-out task is the inventorying, archiving, and/or secure destruction of all sensitive ASMM data sets. The most important of these are the NAOMS data but other sensitive data sets (e.g., APMS digital flight data set(s) have been acquired under the ASMM contract. The types, scope, conveyance, and final disposition of these latter data types also need to be documented. Other activities that will occur within the scope of CTO 11 are the completion of NASA-required subcontracting report and like products and the preparation of a high-level PowerPoint summarizing the key achievements that occurred during the performance of the ASMM contract. Finally, any remaining consultations or analytic inputs on NAOMS needed by NASA will be covered under this CTO.

Deliverables

- Memorandum with supporting spreadsheet documenting the final disposition of ASMM data sets
- PowerPoint presentation documenting key ASMM accomplishments
- Subcontracting Report for Individual Contracts (SF294) – contract completion
- Summary of Subcontract Report (SF295) – contract completion.

Authorization to proceed required? ☐ No ☐ Yes

☐ Start work. NTE: [30 day estimate) until task order plan is approved.

☐ Do not start work until task order plan is approved.

Technical Performance (0-75%):	
Cost Performance (25-100%):	
Schedule Performance (0-75%):	

COTR	Date	Contracting Officer	Date

NASA ARC TASK ORDER

Contract No.: NNA05AC07C		Contract Title: ASMM
Task No.: 11	Task Mod. No.: Original	Task Title: ASMM Phase-out

PART I - TASK ORDER PROPOSAL/AUTHORIZATION SUMMARY

Performance Period: 9/1/2007 to 10/31/2007		Contractor Task Leader: Loren Rosenthal This Request: ☒ Original ☐ Modification	
		THIS REQUEST TASK ESTIMATE	CUMULATIVE TOTAL TASK ESTIMATE
Site/Program Manager Loren Rosenthal	CATEGORIES		
	LABOR HOURS	[redacted]	[redacted]
	LABOR (BURDENED)	[redacted]	[redacted]
	ODC (BURDENED)	[redacted]	[redacted]
COTR	SUBCONTRACTING	[redacted]	[redacted]
	INTERORG'L TRANSFERS	[redacted]	[redacted]
Dr. Irving Statler	FIXED FEE	[redacted]	[redacted]
	TOTAL:	$19,832	$19,832

Comments:

Irving P. Statler 9/10/07 Task Requester		Irving P. Statler 9/10/07 COTR
Loren Rosenthal Site/Program Manager		[signature] 9/14/07 Contracting Officer

PART II - TASK ORDER CLOSEOUT

Final Cost	Date Completed	Site/Program Manager	Task Requester	COTR

ESTIMATED COST DETAIL

FORM C-15

DATE 09/10/07

Title PHASE OUT

Solicitation No. NNA05AC07C
Proposal No. OP46959

	Rate	Hours	Cost
DIRECT LABOR			
Salaried	[redacted]	[redacted]	[redacted]

[Annual Inflation 3.9000 % (0.0000 % Applied)] TOTAL HOURS [redacted] TOTAL DIRECT LABOR $ [redacted]

	Rate %	Base	Cost
FRINGE BENEFITS			
Salaried	[redacted]	[redacted]	[redacted]

TOTAL FRINGE BENEFITS $ [redacted]

	Rate %	Base	Cost
DIVISION OVERHEAD			
Onsite - 2007	[redacted]	[redacted]	[redacted]
Onsite - 2008	[redacted]	[redacted]	[redacted]

TOTAL DIVISION OVERHEAD $ [redacted]

OTHER DIRECT COSTS

General Support Facilities, Special Facilities and Services

Description	Basis for Estimate	Org	Use Rate No.	Rate	Base	Cost
PC UTILITY RECOVERY			PCR	2.5000$	[redacted]	[redacted]

Total General Support Facilities, Special Facilities and Services $ [redacted]

TOTAL OTHER DIRECT COSTS $ [redacted]

	Rate *	Base	Cost
General and Administrative - 2007	[redacted]	[redacted]	[redacted]
General and Administrative - 2008	[redacted]	[redacted]	[redacted]

TOTAL GENERAL AND ADMINISTRATIVE $ [redacted]

PURCHASED MATERIALS

Materials, Supplies, and Miscellaneous

Item Description	Vendor/Basis for Estimate	Quantity	Unit Desc	Unit Price	Cost
MOUNTAINVIEW OFFICE COST	MOUNTAINVIEW OFFICE COST	[redacted]	HR	[redacted]	[redacted]

Subtotal $ [redacted]

Annual Inflation 2.400 % (0.0000 % Applied) $ [redacted]

TOTAL PURCHASED MATERIALS $ [redacted]

ESTIMATED COST $ [redacted]

FEE $ [redacted]

COST OF FACILITIES CAPITAL	Factor	Base	Cost
Based on General and Administrative	[redacted]	[redacted]	[redacted]

TOTAL COST OF FACILITIES CAPITAL $ [redacted]

TOTAL ESTIMATED COST AND FEE $ 19,832

* Amounts are displayed to the nearest dollar. Calculations are based to the nearest cent.

Subject: Retention of NAOMS Records
Date: Thu, 25 Oct 2007 09:21:04 -0700
Thread-Topic: Retention of NAOMS Records
Priority: Urgent
From: "Loren Rosenthal" <loren.rosenthal@battellemvca.org>
To: "Haber, Daniel" <HaberD@BATTELLE.ORG>, <RobertSDodd@comcast.net>,
"Jon Krosnick" <krosnick@stanford.edu>, <msilver@anacapasciences.com>,
"Ferryman, Thomas A" <tom.ferryman@pnl.gov>,
"Allen Carter" <acarter@mail.arc.nasa.gov>,
"Joan Cwi" <cwijs@BATTELLE.ORG>,
"Purcell, Jacinta M" <purcellj@BATTELLE.ORG>
Cc: "Olson, Kathy" <olsonk@BATTELLE.ORG>,
"istatler" <Irving.C.Statler@nasa.gov>,
"Dave Williams" <williamd@BATTELLE.ORG>

To all:

Battelle is in receipt of a letter from the US House of Representatives Committee on Science and Technology pertaining to the NAOMS project. I have already communicated to you the need to assure you do not delete any project related data. By this e-mail I am also forwarding the requirement we have received in the letter. Please assure you fully comply with the requirements set forth below.

Thanks for your cooperation.

Loren

"By this letter, we are directing Battelle Institute, its employees and subcontractors to retain all master copies, and secondary copies in the possession of Battelle or any of its employees or subcontractors. Further, we are directing Battelle Institute, its employees and subcontractors to retain all records (as defined in the Attachment) relating to the NAOMS project and the survey of airline pilots conducted under contract with NASA. Destruction of documents requested as part of a Congressional inquiry is a violation of criminal federal law (18 U.S.C. 1505), and these documents were requested yesterday in a letter to NASA from Chairmen Gordon, Miller and Udall. (Letter dated Oct. 22, 2007, from Chairmen Gordon, Miller and Udall to NASA Administrator Michael Griffin.)

If any records have already been destroyed, please provide a list of the documents destroyed and the date of destruction."

ATTACHMENT

1. The term "records" is to be construed in the broadest sense and shall mean any written or graphic material, however produced or reproduced, of any kind or description, consisting of the original and any non-identical copy (whether different from the original because of notes made on or attached to such copy or otherwise) and drafts and both sides

ENCLOSURE 6

thereof, whether printed or recorded electronically or magnetically or stored in any type of data bank, including, but not limited to, the following: correspondence, memoranda, records, summaries of personal conversations or interviews, minutes or records of meetings or conferences, opinions or reports of consultant, projections, statistical statements, drafts, contracts, agreements, purchase orders, invoices, confirmations, telegraphs, telexes, agendas, books, notes, pamphlets, periodicals, reports, studies, evaluations, opinions, logs, diaries, desk calendars, appointment books, tape recordings, video recordings, e-mails, voice mails, computer tapes, or other computer stored matter, magnetic tapes, microfilm, microfiche, punch cards, all other records kept by electronic, photographic, or mechanical means, charts, photographs, notebooks, drawings, plans, inter-office communications, intra-office and intra-departmental communications, transcripts, checks and canceled checks, bank statements, ledgers, books, records or statements of accounts, and papers and things similar to any of the foregoing, however denominated.

2. The terms "relating," "relate," or "regarding" as to any given subject means anything that constitutes, contains, embodies, identifies, deals with, or is in any manner whatsoever pertinent to that subject, including but not limited to records concerning the preparation of other records.

Kathy A. Olson
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****
****

From: Wholley, Michael C. (HQ-MA000)
Sent: Tuesday, October 23, 2007 11:53 AM
To: Berndt, Thomas W. (ARC-DL); Thompson-King, Sumara M. (HQ-MD000)
Cc: Falcon, R Andrew (HQ-MB000); Steptoe, Jay (HQ-ME000); Sefton, Keith Thomas (HQ-MA000); Spear, Kathleen Mulville (HQ-MB000)
Subject: Congressional Hearing - Protect Info
Importance: High

Tom/Sumara:

In a letter dated 22 Oct the Congress has advised that there will be a hearing on the NAOMS issue and has directed that all relevant info be safeguarded.

10-22-07 Gordon, Miller, Udall...

I need your intervention to ensure that this message to preserve gets out to all necessary parties. Tom, regardless of what the contract with Battelle calls for them to do, please have the COTR get in touch with them ASAP and request that they both preserve everything and that they get in touch with whatever subs they had and tell them to hold on to all data until further directed.

Sumara: can you go through the procurement channels here and see if they have a play in this. I just want to make sure that we cover all the bases!

Thanks.

Mike

Michael C. Wholley
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202.358.2450; FAX: 202.358.2741
Michael.C.Wholley@nasa.gov

ENCLOSURE 7

Subject: Secure Retention of NAOMS Data
Date: Mon, 22 Oct 2007 10:23:13 -0700
Priority: Urgent
From: "Loren Rosenthal" <loren.rosenthal@battellemvca.org>
To: "istatler" <Irving.C.Statler@nasa.gov>,
"Mary Connors" <Mary.M.Connors@nasa.gov>,
"Linda Connell" <Linda.J.Connell@nasa.gov>
Cc: "Dave Williams" <williamd@battelle.org>,
"Dennis Nelson" <nelsondb@battelle.org>,
"Allen Carter" <acarter@mail.arc.nasa.gov>,
"Kimberly Salazar" <kimberly_salazar@battellemvca.org>,
"Haber, Daniel" <HaberD@battelle.org>

All-

The purpose of this email is to affirm, at NASA request, that NASA has never directed Battelle to destroy the master copies of NAOMS survey results data nor has Battelle taken such action. Master copies of all NAOMS survey results are maintained by Battelle in Mountain View, CA on CDs and other backup media. Copies of the CDs have also been conveyed to NASA Ames.

NASA has directed Battelle to recover, or ensure the secure destruction, of any **secondary copies** of the NAOMS data that might be held at locations outside of Mountain View. This includes any copies held by present or past Battelle NAOMS subcontractors. The purpose of this latter action is to ensure that NAOMS conforms to NASA data security requirements. The essential goal is to bring all NAOMS data to a single, secure location managed by NASA. Battelle is in the process of taking this action now as part of the ASMM contract phase-out process. (NAOMS project work has been accomplished under the ASMM contract.)

-Loren Rosenthal
Battelle ASMM Program Manager

ENCLOSURE 8

TIME BEGUN ..... (MILITARY) ..... ⌊⌊⌋⌋:⌊⌊⌋⌋
(FILLS)

INTERVIEWER: DATE OF INTERVIEW IS BEING RECORDED AS (START DATE).
IS THIS THE CORRECT DATE?

YES 1
NO ..... (RECORD DATE OF INTERVIEW) 0

START DATE ..... ⌊⌊⌋⌋/⌊⌊⌋⌋/⌊⌊⌋⌋
MONTH DAY YEAR

START DATE = 30/90 DAYS BEFORE END DATE

END DATE ..... ⌊⌊⌋⌋/⌊⌊⌋⌋/⌊⌊⌋⌋
(FILLS) MONTH DAY YEAR

END DATE = DAY BEFORE DAY OF INTERVIEW

SECTION A: BACKGROUND QUESTIONS

INTRODUCTION:

For this survey most of the questions will refer to (30/90) days prior to today. Therefore, whenever I say the "last (TIME PERIOD), I am referring to the period from (START DATE) through (END DATE).

I am now going to ask you a few questions about the commercial flying that you did during the last (TIME PERIOD).

A1. During the last (TIME PERIOD), how many **hours** did you fly as a crewmember on commercial aircraft?

HOURS IN TIME PERIOD ..... ⌊⌊⌋⌋

PROMPT IF 30 DAYS>100, 90 DAYS>300: *I'd just like to verify. You said you flew (HOURS A1) hours during the last (TIME PERIOD) as a crewmember on a commercial aircraft. Is this correct?*

NO 0
YES ..... (A2) 1
RF ..... (A2) 7
DK ..... (A2) 8

A1 NEW *During the last (TIME PERIOD), how many hours did you fly as a crewmember on a commercial aircraft?*

 # HOURS ..... ⌊⌊⌋⌋
RF 997
DK 998

A2. During the last (TIME PERIOD), how many **legs** did you fly as a crewmember on commercial aircraft?

LEGS IN TIME PERIOD ..... ⌊⌊⌋⌋

A2.1 During the last (TIME PERIOD), how many of the (#A2) legs you flew involved taking off or landing at an airport outside the United States?

NOTE: THE UNITED STATES MEANS THE 50 STATES AND WASHINGTON DC, BUT DOES NOT INCLUDE US TERRITORIES.

LEGS OUTSIDE U.S. ..... ⌊⌊⌋⌋

NUMBER OF LEGS IN A2.1 MUST BE LESS THAN OR EQUAL TO LEGS IN A2.

A3. Please tell me the makes, models and series for all of the aircraft you flew commercially as a crewmember during the last (TIME PERIOD)? RECORD VERBATIM IN COLUMN A, THEN ASK PROMPT.

PROMPT A3_A1: Did you fly any other makes, models or series of aircraft commercially during the last (TIME PERIOD)?	*YES ..... (ASK PROMPT A3_A2) ..... 1* *NO ..... (ASK B) ..... 0* *RF ..... 7* *DK 8*

PROMPT A3_A2: Please tell me the next aircraft make, model and series you flew commercially as a crewmember during the last (TIME PERIOD)? RECORD IN COLUMN A

A. MAKE/MODEL/SERIES (NOTE; MAKE/MODEL/SERIES DROP DOWN SCREEN INCREASED WITH THIS VERSION)	B. During the last (TIME PERIOD), what **percent** of the (HRS IN A1) did you fly the (MAKE/ MODEL/SERIES)?
1st _____	___ %
2nd _____	___ %
3rd _____	___ %
4th _____	___ %
5th _____	___ %
6th _____	___ %
	THE TOTAL PERCENT OF A3-B SHOULD BE 100.

INTRODUCTION:
During the last (TIME PERIOD), you may have transported passengers or cargo, or conducted other flight operations. We would like to understand what types of operations you flew.

A4. During the last (TIME PERIOD), what percent of the (HRS IN A1) did you fly as a crewmember on flights with revenue passengers?

% WITH REVENUE PASSENGERS..... ___

A5. During the last (TIME PERIOD), what percent of the (HRS IN A1) did you work as a crewmember on flights that carried only cargo or freight and did **not** carry revenue passengers?

% CARGO/FREIGHT W/O PASSENGERS..... ___

A6. During the last (TIME PERIOD), what percent of the (HRS IN A1) did you work as a crewmember on flights that carried no revenue passengers or cargo, such as maintenance flights, ferry flights, or repositioning flights?

% NO PASSENGER OR CARGO..... ___

THE TOTAL PERCENT OF A4, A5, AND A6 SHOULD BE 100.

A. What type of flights were these?

SPECIFY: _____

A7. During the last (TIME PERIOD), did you fly a commercial aircraft (READ QUESTIONS)?

	YES	NO	RF	DK
a. as a captain	1	0	7	8
b. as a first officer	1	0	7	8
c. as a flight engineer or second officer	1	0	7	8
d. as a relief pilot	1	0	7	8
e. in any other capacity (SPECIFY)	1	0	7	8

1. What was that capacity?

A7a THROUGH A7e CANNOT ALL BE ANSWERED NO.

SPECIFY: _____

INTERVIEWER: CAN INCLUDE CHECK PILOT.

A7.1 Which of the following three categories best describes the number of airplanes currently operated by your airline? Please do not include airplanes operated by code-share partners. READ CATEGORIES.

NOTE: WE ARE ONLY INTERESTED IN AIRPLANES CURRENTLY BEING USED, NOT THOSE IN STORAGE.

PROBE IF PILOT FLEW FOR MORE THAN ONE AIRLINE IN TIME PERIOD: Please tell me the number of airplanes currently operated by the airline **that you flew the most hours for** in the last (TIME PERIOD).

350 airplanes or more 1
150 to 349 airplanes 2
149 or less airplanes 3
RF 7
DK 8

A8. Approximately how many **hours** in total have you flown a **commercial aircraft during your career**?

TOTAL HOURS DURING CAREER ..... |_|_|_|_|_|

SECTION B: SAFETY RELATED EVENTS

INTRODUCTION:

My next questions are about safety related events. In answering these questions, please report only events that **you experienced on a commercial aircraft on which you were a crewmember**. The first of these questions are about **equipment-related events.**

ER1. How many times during the last (TIME PERIOD) did an aircraft on which you were a crewmember divert to an alternate airport or return to land because of an aircraft equipment problem?

EQUIPMENT PROBLEMS..... ⌊_⌊_⌊_⌋

A. What systems caused the diversion or return to land?

SPECIFY: _____

ER2. How many times during the last (TIME PERIOD) did an aircraft on which you were a crewmember experience a spill, fire, fumes, or aircraft damage due to transporting hazardous materials?

HAZMAT ..... ⌊_⌊_⌊_⌋
IF 0, SKIP TO ER3.

A. (How many of these [# in ER2] times were the spills, fire, fumes or aircraft damage/Was this spill, fire, fumes or aircraft damage) in the cargo compartment?

IN CARGO COMPARTMENT ..... ⌊_⌊_⌊_⌋

THE AMOUNT IN ER2A CANNOT BE GREATER THAN THE AMOUNT IN ER2.

B. (How many of these [# in ER2] times were spills, fire, fumes or aircraft damage/Was this spill, fire, fumes or aircraft damage) in the passenger compartment?

IN PASSENGER COMPARTMENT..... ⌊_⌊_⌊_⌋

THE AMOUNT IN ER2A AND ER2B COMBINED CANNOT BE GREATER THAN THE AMOUNT IN ER2.

C. (How many of these [# IN ER2] times were the spills, fire, fumes or aircraft damage/Was the spill, fire, fumes or aircraft damage) caused because the hazardous materials in question were out of compliance with regulations?

OUT OF COMPLIANCE WITH REGULATIONS..... ⌊_⌊_⌊_⌋

THE AMOUNT IN ER2C CANNOT BE GREATER THAN THE AMOUNT IN ER2.

ER3. How many times during the last (TIME PERIOD) did an aircraft on which you were a crewmember experience a cargo shift

CARGO SHIIFTS..... ⌊_⌊_⌊_⌋

ER4. How many times during the last (TIME PERIOD) did an in-flight aircraft on which you were a crewmember experience uncommanded movements of any of the following devices (READ QUESTIONS)?

a. Uncommanded movements of the elevators? ..... # ELEVATORS ..... ⌊_⌊_⌊_⌋

b. Uncommanded movements of the rudder? ..... # RUDDER..... ⌊_⌊_⌊_⌋

c. Uncommanded movements of the ailerons? ..... # AILERONS..... ⌊_⌊_⌊_⌋

d. Uncommanded movements of the spoilers? ..... # SPOILERS ..... |_|_|_|

e. Uncommanded movements of the speedbrakes? . # SPEEDBRAKERS ..... |_|_|_|

f. Uncommanded movements of the trim tabs? ..... # TRIM TABS ..... |_|_|_|

g. Uncommanded movements of the flaps? ..... # FLAPS ..... |_|_|_|

h. Uncommanded movements of the slats? ..... # SLATS ..... |_|_|_|

i. Did any other devices have uncommanded movements during the last (TIME PERIOD)?

YES 1
NO ..... (SKIP TO ER5) 0
RF ..... (SKIP TO ER5) 7
DK ..... (SKIP TO ER5) 8

1. Which devices?

SPECIFY:_____

2. **FOR EACH DEVICE LISTED IN ER4i1:** How many times did (DEVICE LISTED IN ER4i1) perform uncommanded movements during the last (TIME PERIOD)?

UNCOMMANDED MOVEMENTS ..... |_|_|_|

ER5. How many times during the last (TIME PERIOD) did an inflight aircraft on which you were a crewmember experience smoke, fire, or fumes that originated in any of the following areas (READ QUESTIONS):

A. the engine or nacelle? ..... # IN ENGINE OR NACELLE ..... |_|_|_|

IF 0, SKIP TO ER5B.

1. (Of the [# in ER5A] times there was smoke, fire, or fumes in the engine or nacelle, how many involved/Did the smoke, fire, or fumes in the engine or nacelle involve) electrical components or wiring?

SMOKE/FIRE/FUMES ..... |_|_|_|

THE AMOUNT IN ER5A1 CANNOT BE GREATER THAN THE AMOUNT IN ER5A.

B. the flight deck? ..... # IN FLIGHT DECK ..... |_|_|_|

IF 0, SKIP TO ER5C.

1. (Of the [# in ER5B] times there was smoke, fire, or fumes in the flight deck, how many involved/Did the smoke, fire, or fumes in the flight deck involve) electrical components or wiring?

SMOKE/FIRE/FUMES ..... |_|_|_|

THE AMOUNT IN ER5B1 CANNOT BE GREATER THAN THE AMOUNT IN ER5B.

C. the cargo hold? ..... # IN CARGO HOLD ..... |_|_|_|

IF 0, SKIP TO ER5D.

1. (Of the [# in ER5C] times there was smoke, fire, or fumes in the cargo hold, how many involved/Did the smoke, fire, or fumes in the cargo hold involve) electrical components or wiring? SMOKE/FIRE/FUMES ..... |_|_|_|

THE AMOUNT IN ER5C1 CANNOT BE GREATER THAN THE AMOUNT IN ER5C.

D. the galley? ..... # IN GALLEY ..... |_|_|_|

IF 0, SKIP TO ER5E.

1. (Of the [# in ER5D] times there was smoke, fire, or fumes in the galley, how many involved/Did the smoke, fire, or fumes in the galley involve) electrical components or wiring? SMOKE/FIRE/FUMES ..... |_|_|_|

THE AMOUNT IN ER5D1 CANNOT BE GREATER THAN THE AMOUNT IN ER5D.

E. elsewhere in the passenger compartment? ..... # IN ELECTRICAL COMPONENETS OR WIRING ..... |_|_|_|

IF 0, SKIP TO ER5F.

1. (Of the [# in ER5E] times there was smoke, fire, or fumes elsewhere in the passenger compartment, how many involved/Did the smoke, fire, or fumes elsewhere in the passenger compartment involve) electrical components or wiring? SMOKE/FIRE/FUMES ..... |_|_|_|

THE AMOUNT IN ER5E1 CANNOT BE GREATER THAN THE AMOUNT IN ER5E.

F. During the last (TIME PERIOD), how many times did an inflight aircraft on which you were a crewmember experience smoke, fire or fumes that originated other than in the engine or nacelle, flight deck, cargo hold, galley, or passenger compartment? # ORIGINATE OTHER PLACES ..... |_|_|_|

1. Where did the smoke, fire or fumes originate? SPECIFY.

SPECIFY: _____

ER6. During the last (TIME PERIOD), how many times did an inflight aircraft on which you were a crewmember experience a precautionary engine shutdown? # PRECAUTIONARY ENGINE SHUTDOWNS..... |_|_|_|

ER7. During the last (TIME PERIOD) how many times did an inflight aircraft on which you were a crewmember experience a total engine failure? # TOTAL ENGINE FAILURE ..... |_|_|_|

INTRODUCTION:
The following questions relate to **turbulence**.

During the last (TIME PERIOD), how many times did an aircraft on which you were a crewmember (READ QUESTION)?

TU1. Encounter severe turbulence that caused large abrupt changes in altitude, airspeed, or attitude..... # CAUSED ABRUPT CHANGES..... |_|_|_|
IF 0, SKIP TO TU2.

A. (Of the [#in TU1] severe turbulence encounters, how many occurred/Did this severe turbulence encounter occur) in I.M.C. conditions? I.M.C. = INSTRUMENT METEOROLOGICAL CONDITIONS # IN IMC CONDITIONS ..... |_|_|_|
THE AMOUNT IN TU1A CANNOT BE GREATER THAN THE AMOUNT IN TU1.

B. (Of the [# in TU1] severe turbulence encounters, how many occurred/Did this severe turbulence encounter occur) in clear air? # IN CLEAR AIR ..... |_|_|_|
THE AMOUNT IN TU1A AND TU1B CANNOT BE GREATER THAN THE AMOUNT IN TU1.

TU2. Encounter wake turbulence that resulted in 10 or more degrees of aircraft roll..... # RESULTING IN AIRCRAFT ROLL ..... |_|_|_|

INTRODUCTION:
The next few questions are about **weather-related events while airborne**.

During the last (TIME PERIOD), how many times did an aircraft on which you were a crewmember (READ QUESTION)?

WE1. Lack accurate weather information when crewmembers needed it while airborne..... # LACK WEATHER INFORMATION..... |_|_|_|
IF 0, SKIP TO WE2.

A. (Of the [# WE1] times when crewmembers lacked accurate weather information while airborne, how many involved non-U.S. airports or controllers?/ Did this time when crewmembers lacked accurate weather information while airborne involve a non-U.S. airport or controller?) # INVOLVE NON-US AIRPORT OR CONTROLLER... |_|_|_|
THE AMOUNT IN WE1A CANNOT BE GREATER THAN THE AMOUNT IN WE1.

B. (Of the [# WE1] times when crewmembers lacked accurate weather information while airborne, how many involved ATIS?/Did this time when crewmembers lacked accurate weather information while airborne involve ATIS?)

INVOLVE ATIS ..... ___

THE AMOUNT IN WE1A AND WE1B COMBINED CANNOT BE GREATER THAN THE AMOUNT IN WE1.

WE2. Fail to receive A.T.C. approval for a request to avoid severe weather ..... # FAIL RECEIVE ATC APPROVAL ..... ___

IF 0, SKIP TO WE3.

A. (Of the [# WE2] times crewmembers failed to receive A.T.C. approval to avoid severe weather, how many times was emergency authority invoked in these situations/Was emergency authority invoked in this situation?

EMERGENCY AUTHORITY INVOKED ..... ___

THE AMOUNT IN WE2A CANNOT BE GREATER THAN THE AMOUNT IN WE2.

WE3. Divert to an alternate airfield because of weather ..... # DIVERT TO ALTERNATE AIRFIELD ..... ___

WE4. Experience airframe icing that reduced the aircraft's ability to maintain altitude, speed, stability, or directional control ..... # EXPERIENCE AIRFRAME ICING ..... ___

WE5. Encounter windshear or a microburst condition that resulted in an airspeed deviation of 15 knots or greater ..... # ENCOUNTER WINDSHEAR/MICROBURST ..... ___

WE6. Encounter windshear or a microburst condition that resulted in a windshear avoidance maneuver ..... # RESULT IN WINDSHEAR AVOIDANCE ..... ___

IF A4=0, SKIP TO AC1.

INTRODUCTION:

The next few questions are about **passenger-related events**.

During the last (TIME PERIOD), how many times did an **in-flight** aircraft on which you were a crewmember (READ QUESTIONS):

CP1. Expedite landing or divert to an alternate airport due to a passenger medical emergency ..... # DUE TO PASSENGER MEDICAL EMERGENCY .... ___

CP2. Expedite landing or divert to an alternate airport due to a passenger disturbance ..... # DUE TO PASSENGER DISTURBANCE ..... ___

CP3. During the last (TIME PERIOD), how many times did a crewmember leave the cockpit to handle a passenger disturbance on an inflight aircraft on which you were a crewmember ..... # CREWMEMBERS LEAVE COCKPIT ..... ___

INTRODUCTION:

The next few questions are about **airborne conflicts**.

During the last (TIME PERIOD), how many times did an aircraft on which you were a crewmember (READ QUESTION)?

AC1. Experience a bird strike ..... # BIRD STRIKES ..... |_|_|_|

AC2. Perform an evasive action to avoid an imminent in-flight collision with another aircraft that was never closer than 500 feet including evasive action in response to a TCAS advisory? ..... # EVASIVE ACTIONS ..... |_|_|_|

AC3. Experience less than 500 feet of separation from another aircraft while both aircraft were airborne ..... # LESS THAN 500 FEET SEPARATION ..... |_|_|_|

INTRODUCTION:

The next few questions are about **ground operations**.

During the last (TIME PERIOD), how many times did an aircraft on which you were a crewmember (READ QUESTION)?

GE1. Go off the edge of a runway or taxiway while taxiing ..... # GO OFF EDGE RUNWAY/TAXIWAY ..... |_|_|_|

GE2. Collide or nearly collide with a ground vehicle? ..... # COLLIDE WITH GROUND VEHICLE ..... |_|_|_|

IF 0, SKIP TO GE3.

A. (Of the [# in GE2] near collisions with a ground vehicle, how many occurred/Did this near collision with a ground vehicle occur) while your aircraft was on the ramp, apron or in the gate area? # ON RAMP/APRON/GATE AREA ..... |_|_|_|

THE AMOUNT IN GE2A CANNOT BE GREATER THAN THE AMOUNT IN GE2.

B. (Of the [# in GE2] near collisions with a ground vehicle, how many occurred/Did this near collision with a ground vehicle occur) while your aircraft was on the taxiway? # ON TAXIWAY ..... |_|_|_|

THE AMOUNT IN GE2A AND GE2B COMBINED CANNOT BE GREATER THAN THE AMOUNT IN GE2.

C. (Of the [# in GE2] near collisions with a ground vehicle, how many occurred/Did this near collision with a ground vehicle occur) while your aircraft was on the runway? # ON RUNWAY ..... |_|_|_|

THE AMOUNT IN GE2A, GE2B, AND GE2C COMBINED CANNOT BE GREATER THAN THE AMOUNT IN GE2.

GE3. Skid, slide, or hydroplane resulting in a significant increase in stopping distance during landing ..... # SKID/SLIDE/HYDROPLANE ..... |_|_|_|

GE4. Experience a rejected takeoff ..... # REJECTED TAKEOFFS ..... |_|_|_|

GE5. Go off the edge of a runway while taking off or landing..... # GO OFF EDGE OF RUNWAY ..... |_|_|_|

GE6. Go off the end of the runway ..... # GO OFF END OF RUNWAY..... |_|_|_|

GE7. Inadvertently enter an active runway..... # ENTER ACTIVE RUNWAY ..... |_|_|_|

GE8. Begin takeoff roll while another aircraft occupied or was crossing the same runway..... # TAKEOFF ROLL WITH OCCUPIED RUNWAY..... |_|_|_|

GE9. Land while another aircraft occupied or was crossing the same runway ..... # LAND ON OCCUPIED RUNWAY..... |_|_|_|

GE10. Nearly experience a ground collision with another aircraft while both aircraft were on the ground..... #.NEAR GROUND COLLISION ..... |_|_|_|

IF 0, SKIP TO AH1.

A. (Of the [# in GE10] near collisions with another aircraft, how many occurred/Did this near collision with another aircraft occur) while your aircraft was on the ramp, apron or in the gate area? # ON RAMP/APRON/GATE AREA ..... |_|_|_|

THE AMOUNT IN GE10A CANNOT BE GREATER THAN THE AMOUNT IN GE10.

B. (Of the [# in GE10] near collisions with another aircraft, how many occurred/Did this near collision with another aircraft occur) while your aircraft was on the taxiway? # ON TAXIWAY..... |_|_|_|

THE AMOUNT IN GE10A AND GE10B COMBINED CANNOT BE GREATER THAN THE AMOUNT IN GE10.

C. (Of the [# in GE10] near collisions with another aircraft, how many occurred/Did this near collision with another aircraft occur) while your aircraft was on the runway? # ON RUNWAY..... |_|_|_|

THE AMOUNT IN GE10A, GE10B, AND GE10C COMBINED CANNOT BE GREATER THAN THE AMOUNT IN GE10.

INTRODUCTION:

The next few questions are about **aircraft handling-related events.**

During the last (TIME PERIOD), how many times did an aircraft on which you were a crewmember (READ QUESTION)?

AH1. Use some of its reserve fuel as defined by the F.A.Rs ..... # USE RESERVE FUEL..... |_|_|_|

AH2. Accept an A.T.C. clearance that the aircraft could not comply with because of its performance limits..... # ACCEPT CLEARANCE NOT COMPLY WITH ..... |_|_|_|

AH3. Lose sight of another aircraft from which the aircrew was trying to maintain visual separation ..... # LOSE SIGHT OF AIRCRAFT ..... |_|_|_|

IF 0, SKIP TO AH4.

A. (Of the [# in AH3] times an aircraft lost sight of another aircraft, how many occurred/Did losing sight of another aircraft occur) in marginal visual conditions of 3 miles or less? # IN MARGINAL VISUAL CONDITONS..... |_|_|_|

THE AMOUNT IN AH3A CANNOT BE GREATER THAN THE AMOUNT IN AH3.

AH4.	Inadvertently land without clearance at an airport with an active control tower	# LAND W/O CLEARANCE ☐☐☐
AH5.	Inadvertently begin takeoff roll without A.T.C. clearance at an airport with an active control tower	# TAKEOFF ROLL W/O CLEARANCE ☐☐☐
AH6	Inadvertently deviate from an assigned routing or A.T.C. vector for one minute or more	# DEVIATIONS ☐☐☐
AH7.	Experience a tail strike on landing	# TAIL STRIKES ON LANDING ☐☐☐
AH8.	Experience a tail strike on takeoff	# TAIL STRIKES ON TAKEOFF ☐☐☐
AH9.	Experience a hard landing	# HARD LANDINGS ☐☐☐
AH10.	Take off with an out-of-limit center of gravity	# TAKE-OFF OUT-OF-LIMIT CENTER OF GRAVITY ☐☐☐
AH11.	Take-off overweight	# TAKE-OFF OVERWEIGHT ☐☐☐
AH12.	Commence take-off roll with an improper aircraft configuration	# WITH IMPROPER CONFIGURATION ☐☐☐
AH13.	Experience an unusual attitude for any reason	# UNUSUAL ATTITUDE ☐☐☐
AH14.	Experience a valid stall warning or stick shaker activation	# STALL WARNING/STICK SHAKER ACTIVATION ☐☐☐
AH15.	Nearly collide with terrain or a ground obstruction while airborne?	# NEAR COLLISIONS/GROUND ☐☐☐ **IF 0, SKIP TO AD1.**

INTERVIEWER: INCLUDES BUILDINGS

A.	(Of the [# in AH15] near collisions with terrain or a ground obstruction, how many were/Was this near collision with terrain or a ground obstruction)-brought to your attention by A.T.C.?	# ATC BROUGHT TO YOUR ATTENTION ☐☐
		THE AMOUNT IN AH15A CANNOT BE GREATER THAN THE AMOUNT IN AH15.
B.	(Of the [# in AH15] near collisions with terrain or a ground obstruction, how many were/Was this near collision with terrain or a ground obstruction) detected through direct sighting of the ground or obstruction?	# DETECTED THROUGH DIRECT SIGHTING ☐☐
		THE AMOUNT IN AH15A AND AH15B COMBINED CANNOT BE GREATER THAN THE AMOUNT IN AH15.
C.	(Of the [# in AH15] near collisions with terrain or a ground obstruction, how many were/Was this near collision with terrain or a ground obstruction)-detected through activation of G.P.W.S. or E.G.P.W.S.?	# DETECTED THROUGH GPWS/EGPWS ☐☐
		THE AMOUNT IN AH15A, AH15B, AND AH15C COMBINED CANNOT BE GREATER THAN THE AMOUNT IN GE10.

1. (How many of these [# in AH15c] near collisions were/Was this near collision) detected through activation of E.G.P.W.S.?

DETECTED THROUGH ACTIVATION OF EGPWS. ☐☐☐

THE AMOUNT IN AH15C1 CANNOT BE GREATER THAN THE AMOUNT IN AH15C.

INTRODUCTION:

The next few questions are about **altitude deviations**.

How many times during the last (TIME PERIOD) did an aircraft on which you were a crewmember (READ QUESTIONS)?

AD1. Inadvertently deviate from an assigned altitude by more than 300 feet?.....

ALTITUDE DEVIATIONS ..... ☐☐☐
IF 0, SKIP TO AD2.

A. (Of the [# in AD1] deviations from an assigned altitude, how many were/Was this deviation from an assigned altitude) in response to a TCAS Resolution Advisory?

IN RESPONSE TO TCAS..... ☐☐☐

THE AMOUNT IN AD1A CANNOT BE GREATER THAN THE AMOUNT IN AD1.

AD2. Descend below Minimum Safe Altitude when you were **not** following A.T.C. radar vectors .....

NOT FOLLOWING ATC RADAR VECTORS ..... ☐☐☐

INTRODUCTIONS:

The next few questions are about **interactions with air traffic control**.

AT1. During the last (TIME PERIOD), how many times was an aircraft on which you were a crewmember unable to communicate with A.T.C. in a time-critical situation because of frequency congestion?

UNABLE TO COMMUNICATE WITH ATC ..... ☐☐☐
IF 0, SKIP TO AT2.

These problems may have occurred on the ground, or while airborne in the terminal area, or while en route. I'm going to ask you about each.

A. (Of these [# in AT1] times you were unable to communicate with A.T.C. in a time-critical situation because of frequency congestion, how many occurred/Did the time you were unable to communicate with A. T.C in a time critical situation because of frequency congestion occur) **while on the ground**? .....

WHILE ON GROUND..... ☐☐☐
TIMES

THE AMOUNT IN AT1A CANNOT BE GREATER THAN THE AMOUNT IN AT1.

B. (Of these [# in ATI1] times you were unable to communicate with A.T.C. in a time-critical situation because of frequency congestion, how many occurred/Did the time you were unable to communicate with A. T.C in a time critical situation because of frequency congestion occur) **while airborne in the terminal area?**.....

WHILE AIRBORNE..... ___ # TIMES

THE COMBINED TOTALS IN AT1A AND AT1B CANNOT BE GREATER THAN 100.

C. (Of these [# in ATI1] times you were unable to communicate with A.T.C. in a time-critical situation because of frequency congestion, how many occurred/Did the time you were unable to communicate with A. T.C in a time critical situation because of frequency congestion occur) **while en route?** .....

WHILE EN ROUTE..... ___ # TIMES

THE COMBINED TOTALS IN AT1A, AT1B, AND AT1C CANNOT BE GREATER THAN 100.

AT2. How many times during the last (TIME PERIOD) did an aircraft on which you were a crewmember fly at an undesirably high altitude or airspeed on approach due to an A.T.C. clearance.....

NOTE TO INTERVIEWERS: THIS INCLUDES BUT MAY NOT BE LIMITED TO "SLAM DUNK" APPROACHES.

HIGH ALTITUDE OR AIRSPEED..... ___

SECTION C: JIMDAT QUESTIONS

In the next section, I will be asking you some questions about your flying experience and training as it relates to terminal operations and instrument approaches. As we go forward, please limit you answers to those things that you personally experienced.

JD1. Is the aircraft you flew (most) during the last 60 days equipped with G.P.W.S?

GPWS = ground proximity warning system

NO ..... (SKIP TO JD2) 0
YES 1
RF ..... (SKIP TO JD2) 7
DK ..... (SKIP TO JD2) 8

A. Is it equipped with a terrain display, such as you find in an enhanced G.P.W.S, or Terrain Avoidance Warning System, also known as TAWS (taws)?

NO ..... (SKIP TO JD2) 0
YES 1
RF ..... (SKIP TO JD2) 7
DK ..... (SKIP TO JD2) 8

B. Does your airline require the terrain display to be selected during takeoff at specific airports?

NO OR NEVER ..... (SKIP TO JD2) 0
YES OR SOMETIMES 1
RF ..... (SKIP TO JD2) 7
DK ..... (SKIP TO JD2) 8

C. Does your airline require the terrain display to be selected during descent and landing?

NO OR NEVER 0
YES OR SOMETIMES 1
RF 7
DK 8

D. For times that terrain display is not required, do you usually use it during takeoff?

NO, NOT USUALLY 0
YES, USUALLY 1
RF 7
DK 8

E. For times that terrain display is not required, do you usually use it during descent and landing?

NO, NOT USUALLY 0
YES, USUALLY 1
RF 7
DK 8

F. Has the terrain display experienced a map shift on any aircraft on which you were a crew member?

NO OR NEVER 0
YES OR SOMETIMES 1
RF 7
DK 8

JD2. During the last 60 days, how many times did an aircraft on which you were a crewmember experience a ground proximity warning?

TIMES ..... |_|_|_|

IF ZERO, SKIP TO JD3.

A. Was (this warning/ the most recent of these warnings) valid?

NO ..... (SKIP TO JD3) 0
YES 1
RF ..... (SKIP TO JD3) 7
DK ..... (SKIP TO JD3) 8

B. During this (most recent) warning, did you see the approaching terrain on the terrain display before you heard the aural warning?

NO ..... (SKIP TO JD3) 0
YES 1
RF ..... (SKIP TO JD3) 7
DK ..... (SKIP TO JD3) 8

JD3. During the last 60 days, how many times did an aircraft on which you were a crewmember receive a Minimum Safe Altitude Warning Alert, also known as an MSAW (em-saw) or an altitude awareness call from an A.T.C controller?

TIMES ..... |_|_|_|

IF ZERO, SKIP TO JD4.

A. (During the most recent of these events,) What did your aircraft do in response to the warning?

_____

_____

_____

B. (During this most recent A.T.C. warning event,) Did the aircraft have an enhanced G.P.W.S. or T.A.W.S. (taws) installed?

NO ..... (SKIP TO JD4) 0
YES 1
RF ..... (SKIP TO JD4) 7
DK ..... (SKIP TO JD4) 8

GPWS = GROUND PROXIMITY WARNING SYSTEM
TAWS = TERRAIN AVOIDANCE WARNING SYSTEM

1. Did your aircraft also receive a ground proximity warning from this system?

NO 0
YES 1
RF 7
DK 8

JD4. How many times in the last 60 days, did an aircraft on which you were a crewmember fly a non-precision approach?

TIMES ..... |_|_|_|

IF ZERO, SKIP TO JD8.

A. (Was this non-precision approach flown in I.M.C? / How many of these non-precision approaches were flown in I.M.C?)

TIMES ..... |_|_|_|

IMC = INSTRUMENT METEOROLOGICAL CONDITIONS

JD5. How many times in the last 60 days did an aircraft on which you were a crewmember fly an un-stabilized non-precision approach where the aircraft was not in landing configuration, on airspeed, or on glide-slope by 1,000 feet I.M.C or 500 feet V.M.C?

TIMES ..... |_|_|_|

IF ZERO, SKIP TO JD6.

IMC = METEOROLOGICAL CONDITIONS
VMC = VISUAL METEOROLOGICAL CONDITIONS

A. (During the most recent un-stabilized non precision approach,) What factors contributed to the inability to conduct a stabilized approach?

_____

_____

_____

JD6. During the last 60 days, did an aircraft on which you were a crewmember have the choice between flying a constant angle approach or step-down non-precision approach?

NO ..... (SKIP TO JD7) 0
YES 1
RF ..... (SKIP TO JD7) 7
DK ..... (SKIP TO JD7) 8

A. Which did you choose most often, the constant angle approach or the step-down non-precision approach?

CONSTANT ANGLE 1
STEP-DOWN 2
CHOSE BOTH THE SAME 3
RF 7
DK 8

JD7. During the last 60 days, how many times did an aircraft on which you were a crewmeber fly a non-precision approach to a runway when glide-slope information was available to you?

TIMES ..... |_|_|_|

IF ZERO, SKIP TO JD8.

A. During (this/the most recent) non-precision approach, did you use the glide-slope information?

NO 0
YES 1
RF 7
DK 8

JD8. (Is the aircraft you fly/Are any of the aircraft you fly) LNAV / VNAV (L-nav/V-nav) capable?

LNAV = LATERAL NAVIGATION
VNAV = VERTICAL NAVIGATION

NO ..... (SKIP TO JD9) 0
YES 1
RF ..... (SKIP TO JD9) 7
DK ..... (SKIP TO JD9) 8

A. Does your airline ever require pilots to use LNAV / VNAV (L-nav/V-nav) to fly constant angle approaches?

NO ..... (SKIP TO JD9) 0
YES 1
RF ..... (SKIP TO JD9) 7
DK ..... (SKIP TO JD9) 8

1. In the last 60 days, how many times did an aircraft on which you were a crewmember use LNAV / VNAV (L-nav/V-nav) to fly constant angle approaches?

TIMES ..... |_|_|_|

B. During the last 60 days, how many times did an aircraft on which you were a crewmember not fly an LNAV / VNAV (L-nav/V-nav) approach when that option was available?

TIMES ..... |_|_|_|

IF ZERO, SKIP TO JD9.

1. Please explain why the LNAV / VNAV (L-nav/V-nav) approach wasn't flown (during the most recent time that it was available).

_____

_____

_____

JD9. During the last 60 days, was an aircraft on which you were a crewmember equipped to meet Required Navigation Performance standards, sometimes called R.N.P?

NO ..... (SKIP TO JD10) 0
YES 1
RF ..... (SKIP TO JD10) 7
DK ..... (SKIP TO JD10) 8

A. Does your airline choose to use R.N.P?

NO ..... (SKIP TO JD10) 0
YES 1
RF ..... (SKIP TO JD10) 7
DK ..... (SKIP TO JD10) 8

B. How many times in the last 60 days did an aircraft on which you were a crewmember fly an R.N.P approach?

TIMES ..... |_|_|_|

C. During the last 60 days, how many times did any aircraft on which you were a crewmember not fly an R.N.P approach when that option was available?

TIMES ..... |_|_|_|

IF ZERO, SKIP TO JD10.

1. Please explain why the R.N.P. approach was not flown (most recent time that it was available).

_____

_____

_____

JD10. **IF JD4 = 0, SKIP TO JD11.** During the last 60 days, how many times did an aircraft on which you were a crewmember fly a non-precision approach into an airport without D.M.E.?

TIMES ..... |_|_|_|

IF ZERO, SKIP TO JD11.

DME = DISTANCE MEASURING EQUIPMENT

A. During (this event/the most recent of these events), would D.M.E have improved your ability to land safely?

NO 0
YES 1
RF 7
DK 8

JD11. During the last 60 days, how many times did an aircraft on which you were a crewmember fly an instrument approach into an airport where glide-slope or other ground based vertical angle guidance information was unavailable?

TIMES ..... |_|_|_|

IF ZERO, SKIP TO JD12.

A. During (this approach/the most recent of these approaches), was D.M.E used to calculate the rate of descent for landing?

NO 0
YES 1
RF 7
DK 8

JD12. During the last 60 days, how many times did an aircraft on which you were a crewmember land on a runway without VASI (vasi) or PAPI (papi)?

VASI = VERTICAL APPROACH SLOPE INDICATOR
PAPI = PRECISION APPROACH PATH INDICATOR

TIMES ..... |_|_|_|

IF ZERO, SKIP TO JD13

A. During the most recent of these events) would VASI (vasi) or PAPI (papi) have improved the aircraft's ability to land safely?

NO 0
YES 1
RF 7
DK 8

I would now like to ask you some questions about your airline's written standard operating procedures or S.O.Ps.

JD13. Do your airline's written S.O.Ps include Controlled Flight into Terrain prevention, sometimes called C-FIT (C-fit)?

NO 0
YES 1
RF 7
DK 8

JD14. Do your airline's written S.O.Ps talk about how to avoid circumstances that could lead to an in-flight loss of control?

NO 0
YES 1
RF 7
DK 8

JD15. Do your airline's written S.O.P.s talk about how to perform recovery from unusual **attitudes** and departure from controlled flight?

NO 0
YES 1
RF 7
DK 8

JD16. Do your airline's written S.O.Ps talk about how to avoid approach and landing accidents?

NO 0
YES 1
RF 7
DK 8

JD17. Do your airline's written S.O.Ps talk about how to fly non-precision approaches?

NO 0
YES 1
RF 7
DK 8
NA 9

JD18. Do your airline's written S.O.Ps require the use of constant angle non-precision approaches when that option is available?

NO 0
YES 1
RF 7
DK 8

JD19. **Do your airline's written S.O.Ps talk about how to respond to E.G.P.W.S warnings?**
EGPWS = ENHANCED GROUND PROXIMITY WARNING SYSTEM

NO 0
YES 1
RF 7
DK 8

Now I would like to ask some questions about your recurrent training. By recurrent training I mean training conducted periodically that is designed to maintain your skills and knowledge.

CLARIFICATION: This does not include transition or initial training. Recurrent training can include ground school, simulator training sessions, and any training conducted in the aircraft. I am going to read a list of issues. For each issue, please indicate if that topic or issue was covered during your last recurrent training.

JD20. **In what month and year did you receive your most recent recurrent training?**

MONTH ____
YEAR ____

JD21. **Did your most recent recurrent training talk about basic airmanship?**

NO 0
YES 1
RF 7
DK 8

A. Did your most recent recurrent training talk about normal approach procedures?

NO 0
YES 1
RF 7
DK 8

B. Did your most recent recurrent training talk about approach briefings?

NO 0
YES 1
RF 7
DK 8

C. Did your most recent recurrent training talk about criteria for initiating go-around and missed approaches?

NO 0
YES 1
RF 7
DK 8

D. Did your most recent recurrent training talk about go-around and missed approach execution?

NO 0
YES 1
RF 7
DK 8

E. Did your most recent recurrent training talk about emergency or abnormal conditions procedures?

NO 0
YES 1
RF 7
DK 8

Now I would like to ask you some questions concerning training you may have received addressing controlled flight into terrain, or C-FIT (C-fit), and other issues

JD22. **Have you received C-FIT (C-fit) prevention training from your airline?**

NO ..... (SKIP TO JD23) 0
YES 1
RF ..... (SKIP TO JD23) 7
DK ..... (SKIP TO JD23) 8

A. In what month and year did you receive your most recent C-FIT (C-fit) prevention training?

MONTH ____
YEAR ____

B. Did your most recent C-FIT (C-fit) prevention training talk about minimum obstruction clearance altitudes or MOCA (mo ca)?

NO 0
YES 1
RF 7
DK 8

C. Did your most recent C-FIT (C-fit) prevention training talk about minimum enroute altitudes or M.E.A?

NO 0
YES 1
RF 7
DK 8

D. Did your most recent C-FIT (C-fit) prevention training talk about grid MORAs (mo ras)?

NO 0
YES 1
RF 7
DK 8

MORA = MINIMUM OPERATING RADAR ALTITUDE

E. Did your most recent C-FIT (C-fit) prevention training talk about G.P.W.S or E.G.P.W.S?

NO 0
YES 1
RF 7
DK 8

GPWS = GROUND PROXIMITY WARNING SYSTEM
EGPWS = ENHANCED GROUND PROXIMITY WARNING SYSTEM

F. Did your most recent C-FIT (C-fit) prevention training talk about escape maneuvers in response to G.P.W.S or E.G.P.W.S warnings?

NO 0
YES 1
RF 7
DK 8

GPWS = GROUND PROXIMITY WARNING SYSTEM
EGPWS = ENHANCED GROUND PROXIMITY WARNING SYSTEM

G. Did your most recent C-FIT (C-fit) prevention training talk about drift down procedures after engine failure?

NO 0
YES 1
RF 7
DK 8

H. Did your most recent C-FIT (C-fit) prevention training talk about maintaining situational awareness?

NO 0
YES 1
RF 7
DK 8

I. Did your most recent C-FIT (C-fit) prevention training talk about cockpit resource management, or C.R.M as it relates to C-FIT (C-fit) recovery?

NO 0
YES 1
RF 7
DK 8

NOTE: CRM CAN ALSO = CREW RESOURCE MANAGEMENT

J. How would you rate the quality of the most recent C-FIT (C-fit) prevention training you received from your airline? Would you say it was (READ CATEGORIES)?

Excellent 1
Good 2
Fair 3
Poor 4
Very Poor 5

JD23. **Did you receive training specifically in upset recovery from your airline?**

NO ..... (SKIP TO JD24) 0
YES 1
RF ..... (SKIP TO JD24) 7
DK ..... (SKIP TO JD24) 8

A. In what month and year did you receive your most recent training in upset recovery?

MONTH ..... |__|__|
YEAR ..... |__|__|__|__|

B. Was this training received in a simulator, in a ground school, or both?

SIMULATOR 1
GROUND SCHOOL 2
BOTH 3
RF 7
DK 8

C. How would you rate the quality of the upset recovery training you received? Would you say it was (READ CATEGORIES)?

Excellent 1
Good 2
Fair 3
Poor 4
Very Poor 5
RF 7
DK 8

JD24. **Does your airline provide training in Cockpit or Crew Resource Management, sometimes called C.R.M?**

NO ..... (SKIP TO JD25) 0
YES 1
RF ..... (SKIP TO JD25) 7
DK ..... (SKIP TO JD25) 8

A. Have you received this C.R.M training?

NO ..... (SKIP TO JD25) 0
YES 1
RF ..... (SKIP TO JD25) 7
DK ..... (SKIP TO JD25) 8

B. Did this C.R.M. training change how you manage the flight deck?

NO 0
YES 1
RF 7
DK 8

C. Do you have suggestions for how the C.R.M training might be improved?

NO ..... (SKIP TO JD25) 0
YES 1
RF ..... (SKIP TO JD25) 7
DK ..... (SKIP TO JD25) 8

D. What suggestions do you have?

_____

_____

_____

JD25. **Does your airline have a no-fault missed approach or go-around policy?**

NO 0
YES ..... (SKIP TO JD26) 1
RF ..... (SKIP TO JD26) 7
DK ..... (SKIP TO JD26) 8

CLARIFICATION: No fault means that the airline does not apply disciplinary action or criticize pilots who exercise their authority to exercise a missed approach or go around.

A. Would you favor the institution of such a policy, oppose it, or neither favor nor oppose it?

FAVOR 1
OPPOSE 2
NEITHER FAVOR NOR OPPOSE 3
RF 7
DK 8

JD26. **During the last 60 days did you perform a missed approach or go around?**

NO ..... (SKIP TO JD27) 0
YES 1
RF ..... (SKIP TO JD27) 7
DK ..... (SKIP TO JD27) 8

A. Did you receive any feedback from your airline regarding this missed approach or go around?

NO ..... (SKIP TO JD27) 0
YES 1
RF ..... (SKIP TO JD27) 7
DK ..... (SKIP TO JD27) 8

B. Was that feedback positive, negative, or both positive and negative?

POSITIVE 1
NEGATIVE 2
BOTH POSITIVE AND NEGATIVE 3
RF 7
DK 8

JD27. **Does your airline participate in the safety reporting program called A-SAP (A-sap) also known as the Aviation Safety Action Program?**

NO ..... (SKIP TO JD28) 0
YES 1
RF ..... (SKIP TO JD28) 7
DK ..... (SKIP TO JD28) 8

A. Have you been briefed on this A-SAP (A-sap) program?

NO 0
YES 1
RF 7
DK 8

B. Were you told about the general purpose of the A-SAP (A-sap) program?

NO 0
YES 1
RF 7
DK 8

C. Were you told how to submit an A-SAP (A-sap) report?

NO 0
YES 1
RF 7
DK 8

D. If the situation arises in the future, would you submit an A-SAP (A-sap) report?

NO 0
YES ..... (SKIP TO JD27E) 1
RF ..... (SKIP TO JD27E) 7
DK ..... (SKIP TO JD27E) 8

1. Why not?

_____

_____

_____

E. Do you believe that the confidentiality of A-SAP (A-sap) data is adequately protected?

NO 0
YES ..... (SKIP TO JD27F) 1
RF ..... (SKIP TO JD27F) 7
DK ..... (SKIP TO JD27F) 8

CLARIFICATION: Confidentiality refers to both the reporter and to the use of the data.

1. Why not?

_____

_____

_____

F. Are you aware of any positive changes that have resulted from the A-SAP (A-sap) program?

NO 0
YES 1
RF 7
DK 8

SKIP TO JD29.

JD28. **Does your airline have a procedure or program other than A-SAP (A-sap) for receiving safety reports from pilots?**

NO ..... (SKIP TO JD29) 0
YES 1
RF ..... (SKIP TO JD29) 7
DK ..... (SKIP TO JD29) 8

A. Are you aware of any positive changes that have resulted from this pilot reporting program?

NO 0
YES 1
RF 7
DK 8

B. Would you favor the establishment of an A-SAP (A-sap) program, oppose it, or neither favor nor oppose it?

FAVOR 1
OPPOSE 2
NEITHER FAVOR NOR OPPOSE 3
RF 7
DK 8

JD29. **Does your airline have a Flight Operations Quality Assurance Program, sometimes called FOQA (FO Qua)?**

NO ..... (ASK JD29A) 0
YES ..... (SKIP TO JD29B) 1
RF ..... (SKIP TO JD30) 7
DK ..... (SKIP TO JD30) 8

CLARIFICATION: This is a program at some airlines that analyzes operational data routinely collected from the flight data recorders with concurrence and oversight by the pilot's union or association at that airline.

A. Would you favor the establishment of a FOQA (FO Qua) program at your airline, oppose it, or neither favor nor oppose?

FAVOR 1
OPPOSE 2
NEITHER FAVOR NOR OPPOSE 3
RF 7
DK 8

SKIP TO JD30.

B. Have you been briefed on the program?

NO 0
YES 1
RF 7
DK 8

C. Do you believe that the confidentiality of FOQA (FO Qua) data is adequately protected?

CLARIFICATION: Confidentiality refers to both the identity of the pilot flying the aircraft and to the use of the data.

NO 0
YES 1
RF 7
DK 8

D. Are you aware of any safety improvements that have resulted from the FOQA (FO Qua) program?

NO 0
YES 1
RF 7
DK 8

We are interested in hearing about the safety culture at your airline, as expressed by your senior management. By senior management, we mean the C.E.O., Director of Safety, V.P. for Safety, Director of Flight Operations, and other senior management.

CEO = CHIEF EXECUTIVE OFFICER
VP = VICE PRESIDENT

JD30. **Does your airline have a C.E.O. mission statement on safety?**
CEO = CHIEF EXECUTIVE OFFICER

NO 0
YES 1
RF 7
DK 8

JD31. **Does your airline have a Director of Safety?**

NO 0
YES 1
RF 7
DK 8

JD32. **Does your airline have a V.P. of Safety?**
VP = VICE PRESIDENT

NO 0
YES 1
RF 7
DK 8

JD33. **Have you observed a strong commitment to safety among senior management? (This question focuses on behavior.)**

NO ..... (SKIP TO JD34) 0
YES 1
RF ..... (SKIP TO JD34) 7
DK ..... (SKIP TO JD34) 8

A. Is this senior management commitment to safety reflected throughout **the organization?**

NO 0
YES 1
RF 7
DK 8

JD34. **If you have a safety concern, do you have a mechanism for bringing that concern to the attention of senior management?**

NO ..... (SKIP TO SECTION D) 0
YES 1
RF ..... (SKIP TO SECTION D) 7
DK ..... (SKIP TO SECTION D) 8

A. How effective is this mechanism in reaching senior management? Would you say (READ CATEGORIES)?

Extremely Effective 1
Very Effective 2
Somewhat Effective 3
Not Very Effective 4
Not at all Effective 5

SECTION D: QUESTIONNAIRE FEEDBACK

INTRODUCTION:

I only have a couple more questions and these are about your reactions to the survey we have just done.

D1. How confident are you that you accurately counted all of the safety-related events that I asked you about? Would you say you were (READ QUESTIONS)?

Not confident at all 1
Slightly confident 2
Moderately confident 3
Very confident 4
Extremely confident 5
RF 7
DK 8

D2. Were any of the questions I asked confusing, poorly worded, or ambiguous?

YES 1
NO ..... (SKIP TO D3) 0
RF ..... (SKIP TO D3) 7
DK ..... (SKIP TO D3) 8

A. Could you please describe these question problems? RECORD VERBATIM. AT COMPLETION OF INTERVIEW, ENTER QUESTION NUMBER.

QUESTION NUMBER	RECORD VERBATIM

D3. Are there any safety problems happening within the national aviation system that I did not ask about but that you think may be worth asking about in further surveys?

YES 1
NO ..... (SKIP TO D4) 0
RF ..... (SKIP TO D4) 7
DK ..... (SKIP TO D4) 8

A. What are these problems?

SPECIFY: _____

D4. Do **you** use the internet at home?

YES 1
NO 0
RF 7
DK 8

D5. Do you have any other comments or suggestions about this survey? RECORD VERBATIM.

_____

_____

_____

_____

PANEL PASSWORD HINT

TAKES INTERVIEWER TO "NEEDPAS" (PANEL 1ST QTR OR LATER QTR BUT NEVER COMPLETED INTERVIEW) OR PAST PATH (PANEL 2ND QTR OR LATER WHO PREVIOUSLY GAVE PASSWORD).

NEEDPASS: We would like to be able to link the information you give us each time we call. Because we do not link your information with your name, we would like to record an individual password we can use to link your data. May we please have a password that you will repeat to us when we call you again?

AGREED 1
REFUSED ..... (ENDINT) 7

PICKPASS: RECORD PASSWORD

TAKES INTERVIEWER TO ENDINT.

ASKFORHINT: Please give us a question that we can use as a hint in case you are unable to remember your password the next time we call. For instance, if you choose the word "RED" as your password, your hint question could be "What is my favorite color?"

RECORD HINT

PASTPATH: At the end of your last interview you gave us a password so we could link your information across quarters. Your hint questions was (HINTQUESTION). What was your password? RECORD.

REMEMBERS PASSWORD .....(REPREATPASS) 1
REFUSED ..... (ENDINT) 7
CAN'T REMEMBER ..... (SUBSPASS) 8

REPEATPASS: RECORD PASSWORD.

IF SUCCESSFUL, TAKES INTERVIEWER TO ENDINT.

IF PASSWORD NOT IN PASSWORD LIST: The word you gave me does not match our list of passwords. Perhaps I spelled it wrong. How do you spell your password? RETURN TO REPEATPASS FIELD AND RECORD PASSWORD AGAIN. IF WORD STILL DOESN'T MATCH AFTER TWO ATTEMPTS, CLICK, SUPPRESS.

IF SUPPRESSED, TAKES INTERVIEWER TO SUBSPASS.

SUBSPASS: Since (you can't remember/we don't seem to have) your previous password, we'd like you to choose another password and hint so we can link your future interviews. May we please have another password and hint that you will repeat to us when we call again?

YES ..... (PICKPASS) 1
NO ..... (ENDINT) 0

ENDINT Again, thank you very much for your time and your help with this survey. Your input will help the aviation industry a great deal to measure the level of safety in the aviation system and will be held in confidence. IF PANEL MEMBER: We'll be calling again in three months for your (2nd/3rd/last) interview.

QUESTIONNAIRE LENGTH:

QUESTIONNAIRE LENGTH (MINUTES) ..... |_|_|_|

SECTION B: SAFETY RELATED EVENTS

INTRODUCTION:

My next set of questions are about safety related events. Just as a reminder, I'd like you to report only events that **you experienced flying under FAR** (Part 135/Part 91/Part 135 and Part 91) **on (an airplane/a helicopter) on which you were a** pilot or copilot. The first questions are about **equipment-related events.**

GER1. How many times during the last 60 days did (an airplane/a helicopter) on which you were a pilot or copilot divert to an alternate airport or return to land because of an aircraft equipment problem?

EQUIPMENT PROBLEMS..... ☐☐☐

IF 0, SKIP TO ER2.

A. **ASK ONLY IF MORE THAN ONE MAKE/MODEL IN A13.** Which (airplane/helicopter) experienced this equipment problem (most recently)? Was it (READ A13 MAKE/MODEL LIST)?

RECORD MAKE/MODEL # FROM A13: _____

B. What systems caused the (most recent) diversion or return to land?

SPECIFY: _____

GER2-A. AIRPLANE ONLY

I am going to read a list of possible airplane malfunctions or failures. For each one, please tell me how many times during the last 60 days an **in-flight airplane** on which you were a pilot or copilot experienced any of these malfunctions or failures. If a piece of equipment does not apply, please answer "not applicable" rather than "zero." How many times did you experience (READ QUESTIONS):

	# EXPERIENCES (IF 0, SKIP TO NEXT)	COL. I. ASK ONLY IF MORE THAN ONE MAKE/MODEL IN A13. Which aircraft experienced this malfunction or failure (most recently)? Was it (READ A13 MAKE/MODEL LIST)? RECORD MAKE/ MODEL # FROM A13.
A. Uncommanded movements of the speedbrakes?	☐☐☐	_____
B. Uncommanded movements of the trim tabs?	☐☐☐	_____
C. Uncommanded movements of the flaps?	☐☐☐	_____
D. Failure of the trim system to operate?	☐☐☐	_____
E. Failure of the landing gear to extend or retract?	☐☐☐	_____
F. Failure of the flaps to extend or retract?	☐☐☐	_____

G. Did you experience a malfunction or failure of any other aircraft device or system during the last 60 days?

YES..... 1
NO..... (SKIP TO ER3)..... 0
RF..... (SKIP TO ER3)..... 7
DK..... (SKIP TO ER3)..... 8
NA..... (SKIP TO ER3)..... 9

1. ASK ONLY IF MORE THAN ONE MAKE/MODEL IN A13. Which (airplane/helicopter) experienced this equipment problem (most recently)? Was it (READ A13 MAKE/MODEL LIST)?

RECORD MAKE/MODEL # FROM A13: _____

2. Which device or system malfunctioned or failed (most recently)?

SPECIFY: _____

GER2-H **HELICOPTER ONLY.**
I am going to read a list of possible helicopter malfunctions or failures. For each one, please tell me how many times during the last 60 days an **in-flight helicopter** on which you were a pilot or copilot experienced any of these malfunctions or failures. If a piece of equipment does not apply, please answer "not applicable" rather than "zero". How many times did you experience (READ QUESTIONS)?

	# EXPERIENCES (IF 0, SKIP TO NEXT)	COL. I. **ASK ONLY IF MORE THAN ONE MAKE/MODEL IN A13.** Which helicopter experienced this malfunction or failure (most recently)? Was it (READ A13 MAKE/MODEL LIST)? **RECORD MAKE/ MODEL # FROM A13.**
A. Uncommanded movements of the trim?	___	_____
B. Failure of the trim system to operate?.....	___	_____
C. Failure of the landing gear to extend or retract? ...	___	_____
D. Tail rotor failure?.....	___	_____
E. Failure of the hydraulic system?.....	___	_____
F. Valid transmission warning of potential failure?	___	_____

G. Did you experience a malfunction or failure of any other aircraft device or system during the last 60 days?

YES 1
NO ..... (SKIP TO GER3) 0
RF ..... (SKIP TO GER3) 7
DK ..... (SKIP TO GER3) 8
NA ..... (SKIP TO GER3) 9

1. ASK ONLY IF MORE THAN ONE MAKE/MODEL IN A13. Which (airplane/helicopter) experienced this equipment problem (most recently)? Was it (READ A13 MAKE/MODEL LIST)?

RECORD MAKE/MODEL # FROM A13: _____

2. Which device or system malfunctioned or failed (most recently)?

SPECIFY: _____

GER3. How many times during the last 60 days did an inflight (airplane/helicopter) on which you were a pilot or copilot experience smoke, fire, or fumes that originated in (READ QUESTIONS)?

	# EXPERIENCES (IF 0, SKIP TO NEXT)	COL. 1. **ASK ONLY IF MORE THAN ONE MAKE/ MODEL IN A13.** Which (airplane/ helicopter) (most recently) experienced smoke, fire, or fumes in (ER3 A-E)? Was it (READ A13 MAKE/ MODEL LIST)? **RECORD MAKE/MODEL 3 FROM A13.**	COL. 2. (Of the [# ER3 A-E] times there was smoke, fire, or fumes in the (ER3 A-E), how many involved/Did the smoke, fire, or fumes involve) electrical components or wiring?
A. the engine, engine compartment or nacelle (nuh-**SELL**)?	___	_____	___
B. the cockpit?	___	_____	___
C. the cargo or baggage area?	___	_____	___
D. the passenger compartment area?	___	_____	___
E. some place other than in the engine or nacelle (nuh-**SELL**), cockpit, cargo area, or passenger area?	___	_____	

1. SPECIFY WHERE: _____

GER4. During the last 60 days, how many times did an inflight (airplane/helicopter) on which you were a pilot or copilot experience a precautionary engine shutdown?

PRECAUTIONARY ENGINE SHUTDOWNS ..... ___
IF 0, SKIP TO GER5.

A. **ASK ONLY IF MORE THAN ONE MAKE/MODEL IN A13.** Which (airplane/helicopter) experienced a precautionary engine shutdown (most recently)? Was it (READ A13 MAKE/MODEL LIST)?

RECORD MAKE/MODEL # FROM A13: _____

GER5. During the last 60 days, how many times did an inflight (airplane/helicopter) on which you were a pilot or copilot experience a total engine failure?

TOTAL ENGINE FAILURE ..... ___
IF 0, SKIP TO GER6.

A. **ASK ONLY IF MORE THAN ONE MAKE/MODEL IN A13.** Which (airplane/ helicopter) experienced a total engine failure (most recently)? Was it (READ A13 MAKE/MODEL LIST)?

RECORD MAKE/MODEL # FROM A13: _____

GER6. During the last 60 days, how many times did an inflight (airplane/helicopter) on which you were a pilot or copilot experience total loss of electrical power?

TOTAL ELECTRICAL FAILURE ..... ___
IF 0, SKIP TO GER7.

A. **ASK ONLY IF MORE THAN ONE MAKE/MODEL IN A13.** Which (airplane/ helicopter) experienced a total loss of electrical power (most recently)? Was it (READ A13 MAKE/MODEL LIST)?

RECORD MAKE/MODEL # FROM A13: _____

GER7. During the last 60 days when you were pilot or copilot, how many times did you discover that (an airplane/a helicopter) had incorrect or bogus parts installed?

TOTAL PARTS..... |_|_|_|

IF 0, SKIP TO GER8.

A. ASK ONLY IF MORE THAN ONE MAKE/MODEL IN A13. Which (airplane/ helicopter) had incorrect or bogus parts installed (most recently)? Was it (READ A13 MAKE/MODEL LIST)?

RECORD MAKE/MODEL # FROM A13: _____

GER8. [How many times did you discover that] Cabin doors, baggage doors or cowlings opened inadvertently during flight?

TOTAL DOORS OPEN..... |_|_|_|

IF 0, SKIP TO GER9.

A. **ASK ONLY IF MORE THAN ONE MAKE/MODEL IN A13.** Which (airplane/ helicopter) had doors or cowlings open inadvertently during flight (most recently)? Was it (READ A13 MAKE/MODEL LIST)?

RECORD MAKE/MODEL # FROM A13: _____

GER9. [How many times did you discover that] A door or window came off the aircraft while in flight?

TOTAL DOORS OFF..... |_|_|_|

IF 0, SKIP TO GER10.

A. ASK ONLY IF MORE THAN ONE MAKE/MODEL IN A13. Which (airplane/ helicopter) had doors or windows come off while in flight (most recently)? Was it (READ A13 MAKE/MODEL LIST)?

RECORD MAKE/MODEL # FROM A13: _____

GER10. [How many times did you] experience a cargo shift or cargo coming loose?

TOTAL CARGO LOOSE ..... |_|_|_|

IF 0, SKIP TO GER11.

A. **ASK ONLY IF MORE THAN ONE MAKE/MODEL IN A13.** Which (airplane/ helicopter) experienced a cargo shift or cargo coming loose (most recently)? Was it (READ A13 MAKE/MODEL LIST)?

RECORD MAKE/MODEL # FROM A13: _____

GER11. During the last 60 days, how many times did (an airplane/a helicopter) on which you were a pilot or copilot fly or attempt to fly with fuel contaminated by water?

#TOTAL CONTAMINATED FUEL..... |_|_|_|

IF 0, SKIP TO GER11.

A. **ASK ONLY IF MORE THAN ONE MAKE/MODEL IN A13.** Which (airplane/ helicopter) had water-contaminated fuel (most recently)? Was it (READ A13 MAKE/MODEL LIST)?

RECORD MAKE/MODEL # FROM A13: _____

GER12. [How many times did you] fly or attempt to fly with the wrong type of fuel?

TOTAL WRONG FUEL..... |_|_|_|

IF 0, SKIP TO GER13.

A. **ASK ONLY IF MORE THAN ONE MAKE/MODEL IN A13.** Which (airplane/ helicopter) flew or attempted to fly with the wrong type of fuel (most recently)? Was it (READ A13 MAKE/MODEL LIST)?

RECORD MAKE/MODEL # FROM A13: _____

GER13. [How many times did you] experience a failure of the attitude indicator or artificial horizon?

TOTAL ATTITUDE INDICATOR..... |_|_|_|

IF 0, SKIP TO GTU1.

A. **ASK ONLY IF MORE THAN ONE MAKE/MODEL IN A13.** Which (airplane/ helicopter) experienced this failure (most recently)? Was it (READ A13 MAKE/MODEL LIST)?

RECORD MAKE/MODEL # FROM A13: _____

B. (Of the [# ER13] times the attitude indicator failed, how many occurred/Did this failure of the attitude indicator occur) in instrument meteorological conditions or I.M.C? I.M.C. means the visibility was less than three miles and/or the ceiling was less than 1,000 feet above ground.

TOTAL ATTITUDE INDICATOR IN IMC..... |_|_|_|

INTRODUCTION:

My next questions relate to **turbulence**.

GTU1. During the last 60 days, how many times did (an airplane/a helicopter) on which you were a pilot or copilot encounter severe turbulence that caused large abrupt changes in altitude, airspeed, or attitude?

CAUSED ABRUPT CHANGES..... |_|_|_|

IF 0, SKIP TO TU2.

A. (Of the [# TU1] severe turbulence encounters, how many occurred/Did this severe turbulence encounter occur) in I.M.C. conditions?
I.M.C. = INSTRUMENT METEOROLOGICAL CONDITIONS

IN IMC CONDITIONS ..... |_|_|_|

THE AMOUNT IN TU1A CANNOT BE GREATER THAN THE AMOUNT IN TU1.

B. (Of the [# TU1] severe turbulence encounters, how many occurred/Did this severe turbulence encounter occur) in clear air?

IN CLEAR AIR ..... |_|_|_|

THE AMOUNT IN TU1A AND TU1B CANNOT BE GREATER THAN THE AMOUNT IN TU1.

C. (Of the [# TU1] severe turbulence encounters, how many resulted/Did this severe turbulence encounter result) in one or more occupants being injured?

INJURY EVENTS..... |_|_|_|

GTU2. [During the last 60 days, how many times did you] Encounter wake turbulence that resulted in 45 or more degrees of aircraft roll?

RESULTING IN AIRCRAFT ROLL ..... |_|_|_|

INTRODUCTION:
My next questions are about **weather-related events while airborne.**

GWE1. During the last 60 days, how many times did (an airplane/a helicopter) on which you were a pilot or copilot lack accurate weather information when you needed it while airborne?

LACK WEATHER INFORMATION ..... ⌊_⌊_⌊_

IF 0, SKIP TO WE2.

A. (Of the [# WE1] times when you lacked accurate weather information, how many involved non-U.S. airports or controllers?/ Did this time when you lacked accurate weather information involve a non-U.S. airport or controller?)

INVOLVE NON-US AIRPORT OR CONTROLLER ... ⌊_⌊_⌊_

THE AMOUNT IN WE1A CANNOT BE GREATER THAN THE AMOUNT IN WE1.

B. (Of the [# WE1] times when you lacked accurate weather information, how many involved A-TIS (**A**-tis)?/Did this time when you lacked accurate weather information involve A-TIS (**A**-tis)?)
ATIS=AUTOMATIC TERMINAL INFORMATION SYSTEM

INVOLVE ATIS ..... ⌊_⌊_⌊_

THE AMOUNT IN WE1B CANNOT BE GREATER THAN THE AMOUNT IN WE1.

C. (Of the [# WE1] times when you lacked accurate weather information, how many involved a Flight Service Station?/Did this time when you lacked accurate weather information involve a Flight Service Station?)
FLIGHT SERVICE STATION ALSO REFERRED TO AS F.S.S

INVOLVE FSS ..... ⌊_⌊_⌊_

THE AMOUNT IN WE1C CANNOT BE GREATER THAN THE AMOUNT IN WE1.

D. (Of the [# WE1] times when you lacked accurate weather information, how many involved Flight Watch? /Did this time when you lacked accurate weather information involve Flight Watch?) FLIGHT WATCH = PART OF FSS SYSTEM USED PRIMARILY FOR PILOT REPORTS.

INVOLVE FLIGHT WATCH ..... ⌊_⌊_⌊_

THE AMOUNT IN WE1D CANNOT BE GREATER THAN THE AMOUNT IN WE1.

E. (Of the [# WE1] times when you lacked accurate weather information, how many involved the Automatic Weather Observation Service or Automatic Surface Observation Service?/Did this time when you lacked accurate weather information involve the Automatic Weather Observation Service or Automatic Surface Observation Service?)
AUTOMATIC WEATHER OBSERVATION SERVICE ALSO REFERRED TO AS A.W.O.S. AUTOMATIC SURFACE OBSERVATION SERVICE ALSO REFERRED TO AS A.S.O.S.

INVOLVE AWOS ..... ⌊_⌊_⌊_

THE AMOUNT IN WE1E CANNOT BE GREATER THAN THE AMOUNT IN WE1.

GWE2-A. **AIRPLANE ONLY.**
[How many times did you] divert to an alternate airfield because of weather?

DIVERT TO ALTERNATE AIRFIELD ..... ⌊_⌋⌊_⌋⌊_⌋
AIRPLANE GO TO WE3-A.

GWE2-H **HELICOPTER ONLY.**
[How many times did you] divert to an alternate airfield, heliport or land because of weather?

DIVERT TO ALTERNATE AIRFIELD ..... ⌊_⌋⌊_⌋⌊_⌋
HELICOPTER GO TO WE3-H.

GWE3-A **AIRPLANE ONLY.**
[How many times did you] experience airframe icing that reduced the aircraft's ability to maintain altitude, speed, stability, or directional control?

EXPERIENCE AIRFRAME ICING..... ⌊_⌋⌊_⌋⌊_⌋

GWE3-H **HELICOPTER ONLY.**
[How many times did you] experience airframe or rotor icing that reduced the aircraft's ability to maintain altitude, speed, stability, or directional control?

EXPERIENCE AIRFRAME ICING..... ⌊_⌋⌊_⌋⌊_⌋
AIRPLANE GO TO WE4

GWE4. During the last 60 days, how many times did (an airplane/a helicopter) on which you were a pilot or copilot encounter windshear or a microburst conditions that resulted in an airspeed deviation of 15 knots or greater?

ENCOUNTER WINDSHEAR/MICROBURST ..... ⌊_⌋⌊_⌋⌊_⌋
AIRCRAFT SKIP TO CP1. HELICOPTER CONTINUE.

GWE5-H **HELICOPTER ONLY.**
[How many times did you] experience loss of tail rotor effectiveness due to high density altitude?

ROTOR EFFECTIVENESS ALT ..... ⌊_⌋⌊_⌋⌊_⌋

GWE6-H **HELICOPTER ONLY.**
[How many times did you] experience loss of tail rotor effectiveness due to high winds?

ROTOR EFFECTIVENESS WINDS ..... ⌊_⌋⌊_⌋⌊_⌋

GWE7-H **HELICOPTER ONLY.**
[How many times did you] experience loss of the visible horizon due to white out or brown out conditions on either takeoff or landing?

IN BROWN OUT CONDITIONS..... ⌊_⌋⌊_⌋⌊_⌋

INTRODUCTION:
My next question is about **passenger-related events.**

GCP1. During the last 60 days, how many times were you distracted by a passenger while in flight, through conversation or physical contact?

INCLUDES TAPPING ON SHOULDER.

PAX DISTRACT ..... ⌊_⌋⌊_⌋⌊_⌋

INTRODUCTION: My next questions are about **airborne conflicts.** Just as a reminder, we are only asking about events that you experienced flying during the last 60 days under FAR (Part 135/Part 91/Part 135 and Part 91) as (an airplane/a helicopter) pilot or copilot.

GAC1. How many times did you experience a bird strike?

BIRD STRIKES ..... ⌊_⌋⌊_⌋⌊_⌋

GAC2. [How many times did you] Perform an evasive action to avoid an imminent in-flight collision with another aircraft that was never closer than 500 feet?

EVASIVE ACTIONS ..... |_|_|_|

GAC3. [How many times did you] Experience less than 500 feet of separation from another aircraft while both aircraft were airborne?

LESS THAN 500 FEET SEPARATION ..... |_|_|_|

INTRODUCTION: The next few questions are about **ground operations.**

GGE1. During the last 60 days, how many times did (an airplane/a helicopter) on which you were a pilot or copilot land at a location without a wind sock, wind vane, or other wind indicator device?

WIND INDICATOR ..... |_|_|_|

GGE2. [How many times did you] Take off, or attempt to take off, with control locks, pitot covers, or other protective gear still attached to the aircraft?

INCLUDES BUT NOT LIMITED TO: GEAR FLAGS; ENGINE, INTAKE, OR EXHAUST PLUGS; TIE-DOWNS.

PROTECTIVE GEAR ..... |_|_|_|

GGE3. [How many times did you] Experience an unplanned aborted or rejected takeoff?

REJECTED TAKEOFFS |_|_|_| **HELICOPTER SKIP TO GE11**

GGE4-A. **AIRPLANE ONLY**. During the last 60 days, how many times did an airplane on which you were a pilot or copilot go off the edge of a runway or taxiway while taxiing?

GO OFF EDGE RUNWAY/TAXIWAY ..... |_|_|_|

GGE5-A. **AIRPLANE ONLY**.
[How many times did you] Go off the **edge** of a runway while taking off or landing?

GO OFF EDGE OF RUNWAY ..... |_|_|_|

GGE6-A. **AIRPLANE ONLY**.
[How many times did you] Go off the **end** of the runway?

GO OFF END OF RUNWAY ..... |_|_|_|

GGE7-A. **AIRPLANE ONLY**. During the last 60 days, how many times did an airplane on which you were a pilot or copilot inadvertently enter an active runway?

ENTER ACTIVE RUNWAY ..... |_|_|_|

GGE8-A. **AIRPLANE ONLY**.
[How many times did you] begin takeoff while another aircraft occupied or was crossing the same runway?

TAKEOFF ROLL WITH OCCUPIED RUNWAY ..... |_|_|_|

GGE9-A. **AIRPLANE ONLY.**
[How many times did you] Land while another aircraft occupied or was crossing the same runway?

LAND ON OCCUPIED RUNWAY ..... |_|_|_|
HELICOPTER SKIP TO GE11. AIRPLANE CONTINUE.

GGE10-A. **AIRPLANE ONLY.**
[How many times did you] Hit or collide with a runway or taxiway light?

HIT LIGHTS ..... |_|_|_|

GGE11. During the last 60 days, how many times did (an airplane/a helicopter) on which you were a pilot or copilot hit a deer or other animal other than a bird?

HIT ANIMAL ..... |_|_|_|
HELICOPTER SKIP TO GE13. AIRPLANE CONTINUE.

GGE12-A. **AIRPLANE ONLY.**
[How many times did you] Collide or nearly collide with a ground vehicle?

COLLIDE WITH GROUND VEHICLE ..... |_|_|_|
IF 0, SKIP TO GE14.

A. (Of the [# GE12] collisions or near collisions with a ground vehicle, how many occurred/Did this collision or near collision with a ground vehicle occur) while your aircraft was on the ramp or apron?

ON RAMP/APRON/GATE AREA ..... |_|_|_|
THE AMOUNT IN GE12A CANNOT BE GREATER THAN THE AMOUNT IN GE12.

B. (Of the [# GE12] collisions or near collisions with a ground vehicle, how many occurred/Did this collision or near collision with a ground vehicle occur) while your aircraft was on the taxiway?

ON TAXIWAY ..... |_|_|_|
THE AMOUNT IN GE12A AND GE12B COMBINED CANNOT BE GREATER THAN THE AMOUNT IN GE12.

C. (Of the [# GE12] collisions or near collisions with a ground vehicle, how many occurred/Did this collision or near collision with a ground vehicle occur) while your aircraft was on the runway?

ON RUNWAY ..... |_|_|_|
THE AMOUNT IN GE12A, GE12B, AND GE12C COMBINED CANNOT BE GREATER THAN THE AMOUNT IN GE12.
SKIP TO GE14.

GGE13-H. **HELICOPTER ONLY.**
[How many times did you] Collide or nearly collide with a ground vehicle?

COLLIDE WITH GROUND VEHICLE ..... |_|_|_|
IF 0, SKIP TO GE15.

A. (Of the [# GE13] collisions or near collisions with a ground vehicle, how many occurred/Did this collision or near collision with a ground vehicle occur) while your aircraft was operating at an airport, **not** a heliport?

AT AIRPORT ..... |_|_|_|
THE AMOUNT IN GE13A CANNOT BE GREATER THAN THE AMOUNT IN GE13.

B. (Of the [# GE13] collisions or near collisions with a ground vehicle, how many occurred/Did this collision or near collision with a ground vehicle occur) while your aircraft was operating at a heliport?
NOT AT AN AIRPORT.

AT HELIPORT ..... |_|_|_|
THE AMOUNT IN GE13A AND GE13B COMBINED CANNOT BE GREATER THAN THE AMOUNT IN GE13.

C. (Of the [# GE13] collisions or near collisions with a ground vehicle, how many occurred/Did this collision or near collision with a ground vehicle occur) while your aircraft was operating at an unprepared landing site?

UNPREPARED SITE ..... |_|_|_|
THE AMOUNT IN GE13A, GE13B, AND GE13C COMBINED CANNOT BE GREATER THAN THE AMOUNT IN GE13.
SKIP TO GE15.

GGE14-A. **AIRPLANE ONLY.**
During the last 60 days, how many times did an airplane on which you were a pilot or copilot nearly experience a ground collision with another aircraft while both aircraft were on the ground?

NEAR GROUND COLLISION ..... ⌊_⌊_⌊_⌋
IF 0, SKIP TO GE15.

A. (Of the [# GE14] near collisions with another aircraft, how many occurred/Did this near collision with another aircraft occur) while your aircraft was on the ramp or apron?

ON RAMP/APRON/GATE AREA ..... ⌊_⌊_⌊_⌋
THE AMOUNT IN GE14A CANNOT BE GREATER THAN THE AMOUNT IN GE14.

B. (Of the [# GE14] near collisions with another aircraft, how many occurred/Did this near collision with another aircraft occur) while your aircraft was on the taxiway?

ON TAXIWAY ..... ⌊_⌊_⌊_⌋
THE AMOUNT IN GE14A AND GE14B COMBINED CANNOT BE GREATER THAN THE AMOUNT IN GE14.

C. (Of the [# GE14] near collisions with another aircraft, how many occurred/Did this near collision with another aircraft occur) while your aircraft was on the runway?

ON RUNWAY ..... ⌊_⌊_⌊_⌋
THE AMOUNT IN GE14A, GE14B, AND GE14C COMBINED CANNOT BE GREATER THAN THE AMOUNT IN GE14.

GGE15. During the last 60 days, how many times did you experience a collision or near collision with anything other than an animal, a ground vehicle, or another aircraft while on the ground?

OTHER GROUND COLLISION ..... ⌊_⌊_⌊_⌋
IF 0, SKIP TO AH1.

A. What were the objects you collided with or nearly collided with? SPECIFY.

SPECIFY: _____

INTRODUCTION: My next questions are about **aircraft handling-related events.**

GAH1. During the last 60 days, how many times did (an airplane/a helicopter) on which you were a pilot or co-pilot use some of its reserve fuel as defined by the FAR?

USE RESERVE FUEL ..... ⌊_⌊_⌊_⌋

GAH2. [How many times did you] Accept an A.T.C. clearance that the (airplane/helicopter) could not comply with because of its performance limits?

ACCEPT CLEARANCE NOT COMPLY WITH ..... ⌊_⌊_⌊_⌋

GAH3. [How many times did you] Lose sight of another aircraft from which the pilot or copilot was trying to maintain visual separation?

LOSE SIGHT OF AIRCRAFT ..... ⌊_⌊_⌊_⌋
IF 0, SKIP TO AH4.

A. (Of the [# AH3] times your aircraft lost sight of another aircraft, how many occurred/Did losing sight of another aircraft occur) in marginal visual conditions of 3 miles or less?

IN MARGINAL VISUAL CONDITIONS ..... ⌊_⌊_⌊_⌋
THE AMOUNT IN AH3A CANNOT BE GREATER THAN THE AMOUNT IN AH3.

GAH4. [How many times did you] **Inadvertently** land without clearance at an airport with an **active control tower**?

LAND W/O CLEARANCE ..... ⌊_⌊_⌊_⌋

GAH5. During the last 60 days, how many times did (an airplane/a helicopter) on which you were a pilot or co-pilot inadvertently begin takeoff without A.T.C. clearance at an airport **with an active control tower**?

ATC = AIR TRAFFIC CONTROL.

TAKEOFF ROLL W/O CLEARANCE ..... |_|_|_|

GAH6. [How many times did you] Inadvertently deviate from an assigned routing or A.T.C. vector for one minute or more?

ATC = AIR TRAFFIC CONTROL.

DEVIATIONS ..... |_|_|_|

GAH7. [How many times did you] Take off with an out-of-limit center of gravity?

TAKE-OFF OUT-OF-LIMIT CENTER OF GRAVITY ..... |_|_|_|

GAH8. [How many times did you] Take-off overweight?

TAKE-OFF OVERWEIGHT ..... |_|_|_|
HELICOPTER SKIP TO AH10.
AIRPLANE CONTINUE.

GAH9-A. **AIRPLANE ONLY**. [How many times did you] Commence take-off roll with an improper aircraft configuration?

WITH IMPROPER CONFIGURATION ..... |_|_|_|

GAH10. As a reminder, these questions still refer to the last 60 days. During the last 60 days, how many times did (an airplane/a helicopter) on which you were a pilot or co-pilot experience an unintended unusual attitude for any reason?

UNUSUAL ATTITUDE = AIRCRAFT OUTSIDE NORMAL FLIGHT PARAMETERS FOR CLIMBING, DESCENDING OR TURNING.

UNUSUAL ATTITUDE ..... |_|_|_|
AIRPLANE SKIP TO AH11.
HELICOPTER CONTINUE.

GAH11-H. **HELICOPTER ONLY**. [How many times did you] Experience a valid low rotor R.P.M warning for any reason? RPM = REVOLUTIONS PER MINUTES.

LOW RPM WARNING ..... |_|_|_|
HELICOPTER SKIP TO AH12.
AIRPLANE CONTINUE.

GAH11-A. **AIRPLANE ONLY**. [How many times did you] Experience an unintentional stall or valid stall warning?

STALL WARNING/STICK SHAKER ACTIVATION ... |_|_|_|

GAH12. During the last 60 days, how many times did (an airplane/a helicopter) on which you were a pilot or co-pilot nearly collide with terrain or ground obstruction or wires while airborne?
INCLUDES BUILDINGS.

NEAR COLLISIONS/GROUND ..... |_|_|_|
IF 0, AIRPLANE SKIP TO AH13,
HELICOPTER SKIP TO A14.

A. (Of the [# AH12] near collisions with terrain, ground obstruction or wires, how many were/Was this near collision with terrain, ground obstruction or wires)-brought to your attention by A.T.C.?

ATC = AIR TRAFFIC CONTROL.

ATC BROUGHT TO YOUR ATTENTION ..... |_|_|
THE AMOUNT IN AH12A CANNOT BE GREATER THAN THE AMOUNT IN AH12.

B. (Of the [# AH12] near collisions with terrain, ground obstruction or wires, how many were/Was this near collision with terrain, ground obstruction or wires) detected through direct sighting of the ground or obstruction?

DETECTED THROUGH DIRECT SIGHTING ..... ⌊_⌊_⌊_⌋
THE AMOUNT IN AH12A AND AH12B COMBINED CANNOT BE GREATER THAN THE AMOUNT IN AH12.

C. (Of the [# AH12B] near collisions, how many involved just wires/Did this near collision involve just wires?)

INVOLVING WIRES ..... ⌊_⌊_⌊_⌋
THE AMOUNT IN AH12G CANNOT BE GREATER THAN THE AMOUNT IN AH12.

GAH13-A. **AIRPLANE ONLY**. [How many times did you] **Inadvertently** cross the runway threshold during the landing **approach** with the landing gear up?

CROSS WITH GEAR UP ..... ⌊_⌊_⌊_⌋

A. (Of the [# AH13] times you approached with the landing gear up, how many times/The time you approached with the landing gear up,) did you **actually land** with the gear up?

LAND WITH GEAR UP ..... ⌊_⌊_⌊_⌋
THE AMOUNT IN AH12G CANNOT BE GREATER THAN THE AMOUNT IN AH12.

GAH14. During the last 60 days, how many times did (an airplane/a helicopter) on which you were a pilot or co-pilot inadvertently enter airspace the aircraft was not cleared for?

UNCLEARED AIRSPACE ..... ⌊_⌊_⌊_⌋

GAH15. How many times did you lose track of the natural horizon due to reduced visibility while flying under Visual Flight Rules?
VISUAL FLIGHT RULES ALSO REFERRED TO AS V.F.Rs.

LOSE HORIZON ..... ⌊_⌊_⌊_⌋

INTRODUCTION: The next few questions are about **altitude deviations.**

GAD1. How many times during the last 60 days did (an airplane/a helicopter) on which you were a pilot or copilot **inadvertently** deviate from an altitude assigned by A.T.C.?

ALTITUDE DEVIATIONS ..... ⌊_⌊_⌊_⌋

GAD2. **ASK ONLY IF (A8C/A10C OR A9C/A11C > 0. OTHERS SKIP TO AT1.** Earlier, you indicated you flew (# A8C+A10C OR A9C +A11) I.F.R. flights. (For how many of these flights/For this flight), did you descend below Minimum Safe Altitude when you were **not** following A.T.C. radar vectors?

NOT FOLLOWING ATC RADAR VECTORS ..... ⌊_⌊_⌊_⌋
SHOULD NOT BE > THAN A8C +A10C OR A9C+A11C.

INTRODUCTION: The next few questions are about **interactions with air traffic control.**

GAT1. During the last 60 days, how many times was (an airplane/helicopter) on which you were a pilot or copilot unable to communicate with A.T.C. in a time-critical situation because of frequency congestion?

UNABLE TO COMMUNICATE WITH ATC ..... ⌊_⌊_⌊_⌋
IF 0, SKIP TO AT2.

A. (Of these [# AT1] times you were unable to communicate with A.T.C. in a time-critical situation because of frequency congestion, how many occurred/Did the time you were unable to communicate with A.T.C in a time critical situation because of frequency congestion occur) **while on the ground**?

WHILE ON GROUND ..... |_|_|_|

THE AMOUNT IN AT1A CANNOT BE GREATER THAN THE AMOUNT IN AT1.

B. (Of these [# AT1] times you were unable to communicate with A.T.C. in a time-critical situation because of frequency congestion, how many occurred/Did the time you were unable to communicate with A.T.C in a time critical situation because of frequency congestion occur) **while airborne in the terminal area**?

WHILE AIRBORNE ..... |_|_|_|

THE COMBINED TOTALS IN AT1A AND AT1B CANNOT BE GREATER THAN THE AMOUNT IN AT1.

C. (Of these [# AT1] times you were unable to communicate with A.T.C. in a time-critical situation because of frequency congestion, how many occurred/Did the time you were unable to communicate with A.T.C in a time critical situation because of frequency congestion occur) **while en route**?

WHILE EN ROUTE ..... |_|_|_|

THE COMBINED TOTALS IN AT1A, AT1B, AND AT1C CANNOT BE GREATER THAN THE AMOUNT IN AT1.

GAT2. [How many times did you] fly at an undesirably high altitude or airspeed on approach due to an A.T.C. clearance?

THIS INCLUDES BUT MAY NOT BE LIMITED TO "SLAM DUNK" APPROACHES.

HIGH ALTITUDE OR AIRSPEED ..... |_|_|_|

GAT3. [How many times did you] leave a communications frequency with A.T.C to get a weather briefing?

LEAVE FREQ FOR WEATHER ..... |_|_|_|

GAT4. How many times during the last 60 days were you informed that (an airplane/a helicopter) on which you were a pilot or copilot missed a transmission from A.T.C?

MISS TRANSMISSION ..... |_|_|_|

IF 0, SKIP TO AT5.

A. (Of the [# AT4] times you missed a transmission from A.T.C, how many occurred/Did the time you missed a transmission from A.T.C. occur) **due to being on the wrong frequency**?

WRONG FREQUENCY ..... |_|_|_|

THE AMOUNT IN AT4A CANNOT BE GREATER THAN THE AMOUNT IN AT4.

B. (Of the [# AT4] times you missed a transmission from A.T.C, how many occurred/Did the time you missed a transmission from A.T.C occur) **due to high cockpit noise**?

COCKPIT NOISE ..... |_|_|_|

THE AMOUNT IN AT4A CANNOT BE GREATER THAN THE AMOUNT IN AT4.
IF = 0, SKIPT TO AT5.

1. (Of the [# AT4B] times you missed a transmission due to high cockpit noise, for how many were you/Were you) **wearing a communication headset at the time**?
THIS INCLUDES HELMETS WITH INTEGRAL HEADSET SPEAKERS.

HEADSET ..... |_|_|_|

THE AMOUNT IN AT4B1 CANNOT BE GREATER THAN THE AMOUNT IN AT4B.

GAT5 How many times did you receive out of date, inaccurate or no information about relevant NOTAMs (**NO**-tams)?

NOTAMS = NOTICES TO AIRMEN.

NOTAMS ..... ☐☐☐

SECTION C: IN-CLOSE APPROACH CHANGES

INTRODUCTION:

My next questions are about **clearance changes received on approach** within 10 miles of the runway threshold **that the flight crew did not request**.

IC1. During the last (TIME PERIOD), how many times did an aircraft on which you were a crewmember receive an unrequested clearance change to runway assignment, altitude restrictions or airspeed within 10 miles of the runway threshold?

UNREQUESTED CLEARANCE CHANGES ..... ☐☐☐

IF 00, DK OR RF, SKIP TO SECTION D.
IF 01, CONTINUE WITH ROUTE A.
IF 02 OR MORE, SKIP TO ROUTE B.

ROUTE A—ONLY ONE CHANGE

A. Was this unrequested clearance change declined?

YES ..... (SKIP TO SECTION D) 001
NO 000
RF ..... (SKIP TO SECTION D) 997
DK ..... (SKIP TO SECTION D) 998

B. Did this unrequested clearance change result in (READ QUESTIONS)?

		YES	NO	RF	DK
1.	An unstabilized approach	1	0	7	8
2.	A go-around or missed approach	1	0	7	8
3.	An airborne conflict	1	0	7	8
4.	A wake turbulence encounter	1	0	7	8
5.	Landing with out-of-limit tailwinds or crosswinds	1	0	7	8
6.	Landing on a wrong runway	1	0	7	8
7.	Landing long or fast	1	0	7	8
8.	Landing without clearance	1	0	7	8
9.	A conflict on the ground with another aircraft or ground vehicle?	1	0	7	8
10.	Any other undesirable event after the clearance change?	1	0	7	8
		ASK a.	SKIP TO IC2.		

a. What events occurred?

SPECIFY: _____

SKIP TO IC2.

ROUTE B—TWO OR MORE CHANGES

A. Of the (# IN IC1) unrequested clearance changes, how many, if any, were declined?

UNREQUESTED CLEARANCE CHANGES..... ⌊_⌊_⌊_

IF NUMBER IN IC1A=NUMBER IN IC1, DK or RF, SKIP TO SECTION D.

IF ONLY ONE CHANGE REMAINS, GO TO ROUTE A, IC1B.

THE NUMBER OF UNREQUESTED CLEARANCE CHANGES WAS (NUMBER IC1) SO THE NUMBER OF UNREQUESTED CLEARANCE CHANGES THAT WERE DECLINED HAS TO BE (NUMBER IN IC1) OR FEWER.

B. How many of the accepted clearance changes resulted in (READ QUESTIONS)? IF 01 OR GREATER, ASK C.

THE ANSWERS IN IC1B 1-10 CANNOT BE GREATER THAN IC1 MINUS IC1A.

C. Did (this/any of these) (EVENT) happen in the most recent **accepted** clearance change?

		# CHANGES	YES	NO	RF	DK
1.	An unstabilized approach	⌊_⌊_⌊_	1	0	7	8
2.	A go-around or missed approach	⌊_⌊_⌊_	1	0	7	8
3.	An airborne conflict	⌊_⌊_⌊_	1	0	7	8
4.	A wake turbulence encounter	⌊_⌊_⌊_	1	0	7	8
5.	Landing with out-of-limit tailwinds or crosswinds	⌊_⌊_⌊_	1	0	7	8
6.	Landing on a wrong runway	⌊_⌊_⌊_	1	0	7	8
7.	Landing long or fast	⌊_⌊_⌊_	1	0	7	8
8.	Landing without clearance	⌊_⌊_⌊_	1	0	7	8
9.	A conflict on the ground with another aircraft or ground vehicle?	⌊_⌊_⌊_	1	0	7	8
10.	Any other undesirable event after the clearance change?	⌊_⌊_⌊_	1 ASK a.	0	7	8

IF NONE, SKIP TO IC2.IF ≥1, ASK a.

SKIP TO IC2.

a. What events occurred?

SPECIFY:_____

INTRODUCTION:

(My next questions are about **this accepted clearance** change that we have been talking about./My next questions are about the **most recent clearance change** that the flight crew **accepted.**)

IC2. At which airport did this event occur?

NAME OF AIRPORT: _____

A. Please tell me the location identifier for (AIRPORT).

AIRPORT LOCATION ID: _____

IC3. **ASK ONLY IF TWO OR MORE MODELS REPORTED IN A3. IF ONLY ONE MODEL, SKIP TO IC4.**

Which model aircraft were you flying when this event occurred, the (LIST MODELS IN A3A)? **CODE MODEL FROM A3A**

NAME/MODEL: _____

IC4. Were you a crewmember on an F.M.S. or F.M.C. equipped aircraft at the time of this event?

YES 1
NO ..... (SKIP TO IC8) 0
RF ..... (SKIP TO IC8) 7
DK ..... (SKIP TO IC8) 8

A. Was the F.M.S. or F.M.C. that was being used capable of storing multiple routes?

YES 1
NO ..... (SKIP TO IC8) 0
RF ..... (SKIP TO IC8) 7
DK ..... (SKIP TO IC8) 8

B. Are the navigation and communication frequency changes in this aircraft made through the F.M.S. or F.M.C.?

YES 1
NO 0
RF 7
DK 8

IC5. In response to this clearance change, did the flightcrew reprogram or attempt to reprogram the F.M.S. or F.M.C.

YES 1
NO ..... (SKIP TO IC8) 0
RF ..... (SKIP TO IC8) 7
DK ..... (SKIP TO IC8) 8

IC6. When programming changes were made or attempted, (READ QUESTIONS)?

	YES	NO	RF	DK
A. Did the inputs load properly	1	0	7	8
B. Was it possible to complete the programming within available time	1	0	7	8
C. Were all of the programming inputs cross-checked by other crewmembers?	1	0	7	8
D. Were there other programming difficulties	1	0	7	8
	ASK 1.	SKIP TO IC7.		

1. Please describe these difficulties.

SPECIFY: _____

IC7. Overall, did the F.M.S. or F.M.C. assist you in complying with the clearance change?

YES 1
NO 0
RF 7
DK 8

ONLY IF ROUTE B IC1A IS 2 OR GREATER, READ INTRODUCTION:

INTRODUCTION:

Before we continue, I want to remind you that these questions are still about the **most recent** unrequested clearance change within 10 miles of the runway threshold.

IC8. Was the aircraft on an instrument approach prior to the clearance change?

YES 1
NO ..... (SKIP TO IC9) 0
RF ..... (SKIP TO IC9) 7
DK ..... (SKIP TO IC9) 8

A. Did this change involve a change from an instrument approach to a visual approach?

YES 1
NO ..... (SKIP TO IC10) 0
RF ..... (SKIP TO IC10) 7
DK ..... (SKIP TO IC10) 8

IC9. Did this change involve a change from a visual approach to an instrument approach?

YES 1
NO 0
RF 7
DK 8

IC10. Was the aircraft programmed for an auto-coupled approach at the time of the clearance change?

YES 1
NO 0
RF 7
DK 8
NA 9

IC11. Did this clearance change change the aircraft's runway assignment?

YES 1
NO ..... (SKIP TO IC12) 0
RF ..... (SKIP TO IC12) 7
DK ..... (SKIP TO IC12) 8

A. Did the runway reassignment involve a change from one runway to another parallel runway

YES 1
NO 0
RF 7
DK 8

IC12. Did this clearance change change the aircraft's altitude assignment?

YES 1
NO 0
RF 7
DK 8

IC13. Did this clearance change change the aircraft's airspeed assignment?

YES 1
NO 0
RF 7
DK 8

ONLY IF ROUTE B IC1A IS 2 OR GREATER, READ INTRODUCTION:

INTRODUCTION:

Once again, before we continue, I want to remind you that these questions are still about the **most recent** unrequested clearance change within 10 miles of the runway threshold.

IC14. In response to this clearance change, did the flightcrew (READ QUESTIONS)?

	YES	NO	RF	DK
A. Change a navigational aid frequency	1 (ASK 1)	0 (SKIP TO B)	7 (SKIP TO B)	8 (SKIP TO B)
1. Confirm the identity of the new navaid	1	0	7	8
B. Change the A.T.C. communication frequency	1	0	7	8
C. Revise the approach briefing	1	0	7	8
D. Change the airplane configuration	1	0	7	8
E. Disconnect any of the automated control systems?	1	0	7	8

IC15. Was the flight crew given a reason for the clearance change?

YES 1
NO ..... (SKIP TO IC16) 0
RF ..... (SKIP TO IC16) 7
DK ..... (SKIP TO IC16) 8

A. Was one of the reasons given (READ QUESTIONS)?

	YES	NO	RF	DK
1. Wake turbulence avoidance	1	0	7	8
2. Maintaining traffic flow and separation	1	0	7	8
3. Providing a runway favorable to your gates	1	0	7	8
4. A change in active runways	1	0	7	8
5. Weather or wind factors	1	0	7	8
6. Noise abatement factors	1	0	7	8
7. A.T.C. equipment problems	1	0	7	8
8. Was any other reason given for the clearance change	1 ASK a	0	7	8

SKIP TO IC16

a. What reasons were given?

SPECIFY: _____

IC16. Did responding to the clearance change (READ QUESTIONS)?

	YES	NO	RF	DK
A. reduce the quality of cockpit coordination	1	0	7	8
B. reduce situational awareness	1	0	7	8
C. Compromise traffic watch	1	0	7	8
D. Was safety compromised in any other way	1 ASK 1.	0	7	8

SKIP TO SECTION D.

1. How was safety compromised?

SPECIFY:_____

SECTION D: QUESTIONNAIRE FEEDBACK

INTRODUCTION: I only have a couple more questions and these are about your reactions to the survey we have just done.

GD1. How confident are you that you accurately counted all of the safety-related events that I asked you about? Would you say you were (READ QUESTIONS)?

Not confident at all.....1
Slightly confident.....2
Moderately confident.....3
Very confident.....4
Extremely confident.....5
RF.....7
DK.....8

GD2. Were any of the questions I asked confusing, poorly worded, or ambiguous?

YES.....1
NO.....(SKIP TO D3).....0
RF.....(SKIP TO D3).....7
DK.....(SKIP TO D3).....8

A. Could you please describe these question problems? RECORD VERBATIM. AT COMPLETION OF INTERVIEW, ENTER QUESTION NUMBER.

QUESTION NUMBER	RECORD VERBATIM

GD3. Are there any safety problems happening within the national aviation system that I did not ask about but that you think may be worth asking about in future surveys?

YES.....1
NO.....(SKIP TO D4).....0
RF.....(SKIP TO D4).....7
DK.....(SKIP TO D4).....8

A. What are these problems?

SPECIFY: _____

GD4. Do **you** use the internet at home?

YES.....1
NO.....0
RF.....7
DK.....8

GD5. Do you have any other comments or suggestions about this survey? RECORD VERBATIM.

_____

_____

_____

_____

ENDINT **Again, thank you very much for your time and your help with this survey. Your input will help the aviation industry a great deal to measure the level of safety in the aviation system and will be held in confidence.**

QUESTIONNAIRE LENGTH:

QUESTIONNAIRE LENGTH (MINUTES) .....|_|_|_|

INTRODUCTION: This section of the interview focuses on weather-related issues, beginning with **weather planning for your flights.** Just as a reminder, we are still only asking about events that you experienced during the last 60 days flying under FAR (Part 135/Part 91 Part 135 and Part 91) as (an airplane/a helicopter) pilot or copilot. Again, we use the terms "flight" throughout this interview to mean the period of time between each takeoff and landing, even if that flight time is short such as for instructors teaching students to land or undertaking "touch and goes."

GC1. Earlier in the interview, you indicated you made [#A8+A10 airplane/A9+A12 helicopter] takeoff(s) during the last 60 days. (For how many of these flights did you obtain pre-flight weather information? /On this flight, did you obtain pre-flight weather information?)

FLIGHTS WEATHER BRIEFING ..... |_|_|_|

CANNOT BE GREATER THAN A8+A10 FOR AIRPLANE OR A9+ A11 FOR HELICOPTER.
IF 0, SKIP TO C3.

A. How many times was preflight information obtained by (READ QUESTIONS)?

1. Commercial TV, radio, or cable weather broadcast that **was not** specific to aviation..... |_|_|_|
2. Commercial TV, radio, or cable weather broadcast that **was** specific to aviation ..... |_|_|_|
3. Company provided weather from a dispatcher..... |_|_|_|
4. DUATS (DO-whats) or other computer-accessed aviation weather services (DUATS = COMPUTER-BASED WEATHER SERVICE PROVIDED BY THE FAA) ..... |_|_|_|
5. Pre-recorded Flight Service Station Weather Briefs FLIGHT SERVICE STATION = F.S.S. ..... |_|_|_|
6. Verbal briefings with FAA flight service station specialists FLIGHT SERVICE STATION ALSO REFERRED TO AS F.S.S. ..... |_|_|_|
7. Did you obtain pre-flight weather information in some other way?

YES 1
NO ..... (SKIP TO C2) 0
RF ..... (SKIP TO C2) 7
DK ..... (SKIP TO C2) 8

a. How did you obtain the weather information? SPECIFY.

SPECIFY: _____

GC2. **IF ONLY ONE QUESTION ANSWERED IN C1A1-7, SKIP TO C2A.** You said you used the following pre flight weather information sources in the last 60 days (LIST ITEMS CODED ONE OR HIGHER IN C1A1-7). Which did you use most recently?
CODE ONLY ONE.

COMMERCIAL SOURCES NOT SPECIFIC TO AVIATION 01
COMMERCIAL SOURCES SPECIFIC TO AVIATION 02
COMPANY PROVIDED WEATHER INFORMATION 03
DUATS OR OTHER COMPUTER ACCESSED WEATHER 04
THE PRE-RECORDED FLIGHT SERVICE STATION 05
A VERBAL F.A.A. BRIEFING 06
OTHER PREFLIGHT INFORMATION 07
RF 97
DK 98

A. How understandable was the weather information you received most recently from (SOURCE LISTED IN C2/SINGLE SOURCE IN C1A1-7)? Would you say it was (READ OPTIONS)?

Not at all understandable 1
Slightly understandable 2
Moderately understandable 3
Very understandable 4
Extremely understandable 5
RF 7
DK 8

B. How accurate was that weather information you received most recently from (SOURCE LISTED IN C2/SINGLE SOURCE IN C1A1-7) in relation to the weather conditions you encountered during flight? Would you say the information was (READ OPTIONS)?

Not at all accurate 1
Slightly accurate 2
Moderately accurate 3
Very accurate 4
Extremely accurate 5
RF 7
DK 8

C. How much time elapsed between your most recent weather briefing and the time of takeoff?

HOURS ..... |___|___|___|
MINUTES ..... |___|___|___|

GC3. In which state or states do you primarily fly?

RECORD UP TO 3 STATES USING STATE CODE LIST BELOW. IF PILOT GIVES OTHER TYPE OF ANSWER (E.G., "NORTHEAST"), RECORD.

STATE 1 ..... |___|___|
STATE 2 ..... |___|___|
STATE 3 ..... |___|___|
OTHER ..... (SPECIFY) 55

1. RECORD OTHER ANSWER: _____

GC4. As a reminder, we are still only asking about events that you experienced flying under FAR (Part 135/Part 91/Part 135 and Part 91) as (an airplane/a helicopter) pilot or copilot (Of the [#A8+A10 airplane/A9+A11 helicopter] takeoffs you made during the last 60 days, how many of these flights were/Was the takeoff you made during the last 60 days) conducted under V.F.R flight rules?

VFR = VISUAL FLIGHT RULES: VISIBILITY GREATER THAN 3 MILES AND CEILING GREATER THAN 1,000 FEET ABOVE GROUND LEVEL.

TAKEOFFS UNDER VFR ..... |___|___|___|

CANNOT BE GREATER THAN A8+A10 FOR AIRPLANE OR A9 + A11 FOR HELICOPTER.

GC5. Do you, or your organization, apply pre-flight **V.F.R** weather minimums that are more conservative than those required by the F.A.A?

IF PILOT MENTIONS IFR HERE, LET HIM/HER KNOW WILL BE GETTING TO IFR LATER IN THE INTERVIEW.

NO ..... (SKIP TO C6) 0
YES 1
RF ..... (SKIP TO C6) 7
DK ..... (SKIP TO C6) 8

A. Under those more conservative weather minimums, what is the minimum number of **miles of visibility** you or your organization require?
TYPE ENTIRE NUMBER, INCLUDING DECIMAL.

MILES VFR MIN VISIBILITY ..... ⌊_⌊_⌊_⌋

B. Under those more conservative weather minimums, what is the minimum **ceiling in feet** that you or your organization require?

FEET VFR MIN CEILING ..... ⌊_⌊_⌊_⌊_⌋

INTRODUCTION: My next questions are about the weather related issues **during** the flights.

GC6. Again, you indicated you made [#A8+A10 airplane/ A9+A11 helicopter] takeoff(s) as a pilot or copilot during the last 60 days. (On how many of these flights/On that flight) did poor weather result in you losing track of your position?

LOST DUE TO WEATHER ..... ⌊_⌊_⌊_⌋

CANNOT BE GREATER THAN A8+A10 FOR AIRPLANE OR A9+A11 FOR HELICOPTER.
IF 0, SKIP TO C7.

A. (For the most recent flight/For that flight), what was the visibility in miles?
TYPE ENTIRE NUMBER, INCLUDING DECIMAL.

VISIBILITY IN MILES ..... ⌊_⌊_⌊_⌋.⌊_⌊_⌋

GC7. (In how many of the [#A8+A10 airplane/A9+A11 helicopter] flights did you experience spatial disorientation from poor visibility due to weather/On that flight did you experience spatial disorientation from poor visibility due to weather?)

TIMES SPATIAL DISORIENTATION ..... ⌊_⌊_⌊_⌋

CANNOT BE GREATER THAN A8+A10 FOR AIRPLANE OR A9+A11 FOR HELICOPTER.
IF 0, SKIP TO C8.

A. (How many of these flights occurred at night? / Did that flight occur at night?

SPATIAL DISORIENTATION AT NIGHT ..... ⌊_⌊_⌊_⌋

CANNOT BE GREATER THAN C7.

B. For (the most recent/that) time you experienced spatial disorientation due to weather, what was the estimated visibility in miles?
TYPE ENTIRE NUMBER, INCLUDING DECIMAL

VISIBILITY IN MILES ..... ⌊_⌊_⌊_⌋.⌊_⌊_⌋

GC8. Again, you indicated you made [#A8+A10 airplane/ A9+A11 helicopter] takeoff(s) as a pilot or copilot during the past 60 days. (On how many of the these flights/On that flight) did you inadvertently enter instrument meteorological conditions, or I.M.C., while on (a/that) V.F.R flight?

IMC = INSTRUMENT METEOROLOGICAL CONDITIONS: VISIBILITY LESS THAN 3 MILES AND/OR CLOUD CEILING LESS THAN 1,000 FEET ABOVE GROUND LEVEL.
VFR = VISUAL FLIGHT RULES: VISIBILITY GREATER THAN 3 MILES AND CEILING GREATER THAN 1,000 FEET ABOVE GROUND LEVEL

INADVERTENT IMC ..... ⌊_⌊_⌊_⌋

CANNOT BE GREATER THAN A8+A10 FOR AIRPLANE OR A9+A11 FOR HELICOPTER.
IF 0, SKIP TO C9.

A. (How many times did this/Did this) occur at night?

IMC AT NIGHT ..... ⌊_⌊_⌊_⌋

CANNOT BE GREATER THAN C8.

B. How did you resolve (the most recent/that) inadvertent I.M.C problem? Did you (READ ANSWERS)?
CODE ALL THAT APPLY.

Ask for A.T.C help without declaring an emergency 01
Ask for A.T.C help and declare an emergency 02
Reverse course 03
Climb 04
Descend 05
File I.F.R 06
Do something else..... (SPECIFY) 07
RF 97
DK 98

1. How did you resolve that I.M.C. problem?

SPECIFY: _____

GC9. (On how many of the [#A8+A10 airplane/A9+A11 helicopter] flights/On that flight) you made during the last 60 days, did weather conditions result in you conducting a go-around or missed approach on landing?

GO AROUND ..... |_|_|_|

CANNOT BE GREATER THAN A8+A10 FOR AIRPLANE OR A9+A11 FOR HELICOPTER.
IF 0, SKIP TO C10.

A. (How many times was this go-around or missed approach/Was this go-around or missed approach) **due to poor visibility**?
PROMPT: PILOT CONDUCTED GO-AROUND OR MISSED APPROACH ON LANDING DUE TO WEATHER CONDITIONS.

GO AROUND VIS ..... |_|_|_|

CANNOT BE GREATER THAN C9.

B. (How many times was this go-around or missed approach/Was this go-around or missed approach **due to high winds**?

PROMPT: PILOT CONDUCTED GO-AROUND OR MISSED APPROACH ON LANDING DUE TO HIGH WINDS.

GO AROUND WINDS ..... |_|_|_|

CANNOT BE GREATER THAN C9.

GC10. (On how many of the [#A8+A10 airplane/A9+A11 helicopter] flights/On that flight) did worsening weather conditions result in you diverting to an alternative landing site?

LAND DUE TO WEATHER ..... |_|_|_|

CANNOT BE GREATER THAN A8+A10 FOR AIRPLANE OR A9+A11 FOR HELICOPTER.
IF 0, SKIP TO C11.

A. (On the most recent/On that) flight when you diverted to an alternative landing site, how did you determine that the weather was worsening? Did you (READ ANSWERS)?
CODE ALL THAT APPLY.

Receive an updated in-flight weather briefing from a Flight Service Station 1
Observe the weather directly from the cockpit 2
Obtain pilot reports from other pilots using Flight Watch ... 3
Do something else..... (SPECIFY) 4
RF 7
DK 8

1. How did you determine the weather was worsening?

SPECIFY: _____

THE FOLLOWING QUESTIONS ARE FOR VFR RATED PILOTS ONLY

DETERMINED FROM QUESTION A1=NO (0), ALL OTHERS, SKIP TO C15.

GC11. My next questions are about **instrument flying**. I'm going to ask a few questions about instrument flying you may have conducted on the [#A8+A10 airplane/ A9+A11 helicopter] flights you flew as (an airplane/a helicopter) pilot or copilot over the last 60 days. (On how many of these flights /On that flight), did you find yourself flying V.F.R over a cloud deck, sometimes called "V.F.R on top," where you had to penetrate the cloud deck in order to land?
VFR = VISUAL FLIGHT RULES: VISIBILITY GREATER THAN 3 MILES AND CEILING GREATER THAN 1,000 FEET ABOVE GROUND LEVEL.

VFR ON TOP ..... |_|_|_|

CANNOT BE GREATER THAN A8+A10 FOR AIRPLANE OR A9+A11 FOR HELICOPTER.
IF 0, SKIP TO C12..

A. (On the most recent/On that) flight when you flew V.F.R. over a cloud deck, how did you get through the cloud deck to land? Did you (READ CATEGORIES)?

CODE ALL THAT APPLY.

Ask for A.T.C. help without declaring an emergency 1
Ask for A.T.C. help and declared an emergency 2
Descended through the clouds without contacting anyone 3
File I.F.R 4
Or something else ..... (SPECIFY) 5
RF 7
DK 8

1. How did you get through the cloud deck to land?
   SPECIFY: _____

GC12. How many hours of instrument training have you received since you began to fly?

HOURS OF INSTRUMENT TRAINING ..... |_|_|_|

GC13. How many hours of training have you received in actual I.M.C conditions since you began to fly?

IMC = INSTRUMENT METEOROLOGICAL CONDITIONS: VISIBILITY LESS THAN 3 MILES AND/OR CLOUD CEILING LESS THAN 1,000 FEET ABOVE GROUND LEVEL.

HOURS OF ACTUAL INSTRUMENT TRAINING ..... |_|_|_|

GC14. How long ago was your last instrument training session?
THIS INCLUDES BIENNIAL FLIGHT REVIEWS.

YEARS ..... |_|_|_|
MONTHS ..... |_|_|_|
DAYS ..... |_|_|_|

THE FOLLOWING QUESTIONS ARE FOR IFR RATED PILOTS ONLY

DETERMINED FROM QUESTION A1A=1, OTHERS, SKIP TO D1.

INTRODUCTION: My next questions are about **instrument flying.** Now I am going to ask a few questions about instrument flying you may have conducted as (an airplane/a helicopter) pilot or copilot.

GC15. (On how many of the [#A8+A10 airplane/A9+A11 helicopter] flights/On that flight) you conducted in the last 60 days did you file an I.F.R flight plan?
IFR= INSTRUMENT FLIGHT RULES.

IFR FLIGHT PLANS ..... |_|_|_|

CANNOT BE GREATER THAN A8+A10 FOR AIRPLANE OR A9+A11 FOR HELICOPTER.
IF 0, SKIP TO C16.

A. (Of these [# C15] flights when you filed an I.F.R flight plan, how many had I.M.C conditions at least part of the time/When you filed this I.F.R flight plan, did it have I.M.C conditions at least part of the time?
IMC: = INSTRUMENT METEOROLOGICAL CONDITIONS: VISIBILITY LESS THAN 3 MILES AND/OR CLOUD CEILING LESS THAN 1,000 FEET ABOVE GROUND LEVEL.

#IMC CONDITIONS ..... |_|_|_|

CANNOT BE GREATER THAN C15.

GC16. Do you, or your organization, apply pre-flight **I.F.R** weather minimums that are more **conservative** than that required by the F.A.A?
IFR= INSTRUMENT FLIGHT RULES.

YES 1
NO ..... (SKIP TO C17) 0
RF ..... (SKIP TO C17) 7
DK ..... (SKIP TO C17) 8

A. Under those more conservative I.F.R weather minimums, what is the minimum number of **miles of visibility** you or your organization require?

IFR MILES VISIBILITY ..... |_|_|_|_|

B. Under those conservative I.F.R weather minimums, what is the **minimum ceiling in feet** you require?

IFR IN FEET CEILING ..... |_|_|_|_|_|

GC17. **IF C15 IS 0, 7,8 OR 9, SKIP TO C18.** During the last flight you flew where you filed I.F.R, did the aircraft have (READ QUESTIONS)?

	NO	YES	RF	DK
A. Weather radar or thunderstorm detection equipment	0	1	7	8
B. Autopilot, including wing levelers	0	1	7	8
C. **AIRPLANES ONLY.** Anti-icing equipment that is approved for flight in icing conditions	0	1	7	8

GC18. (On how many of the [# FLIGHTS IN C15] flights when you filed an I.F.R flight plan/When you filed the I.F.R. flight plan), did you fly an instrument approach to land in I.M.C.?
IMC = INSTRUMENT METEOROLOGICAL CONDITIONS: VISIBILITY LESS THAN 3 MILES AND/OR CLOUD CEILING LESS THAN 1,000 FEET ABOVE GROUND LEVEL.

INSTRUMENT LANDING IMC ..... |_|_|_|

IF 0, SKIP TO D1. CANNOT BE GREATER THAN C15.

A. During the (last) flight where you flew an instrument approach to landing in I.M.C conditions, what type approach was flown?
DO **NOT** READ UNLESS REQUESTED.

I.L.S. (INSTRUMENT LANDING SYSTEM) 01
V.O.R. (VERY-HIGH FREQUENCY OMNI RANGE) 02
R.N.A.V. (RADAR NAVIGATION – R-nav) 03
G.P.S. (GEODESIC POSITION SYSTEM) 04
L.D.A. (LIMITED DESCENT ALTITUDE) 05
S.D.F. (SIMPLIFIED DIRECTIONAL FACILITY) 06
N.D.B. (NON-DIRECTIONAL BEACON) 07
BACK COURSE I.L.S 08
SOMETHING ELSE .....(ASK C18A1) 09
RF 7
DK 8

1. What other approach was flown?

SPECIFY: _____

B. During the (last) flight where you flew an instrument approach to landing in I.M.C conditions, what was the ceiling, in feet, during the approach?

CEILING INSTRUMENT LANDING FEET ..... ___
RF 997
DK 998

C. During the (last) flight where you flew an instrument approach to landing in I.M.C., what was the visibility during the approach in miles or R.V.R?
RVR =RUNWAY VISUAL RANGE (IN FEET).

VISIBILITY INSTRUMENT MILES ..... ___
RVR IN FEET ..... ___
RF 997
DK 998

GC19. **IF A6 = 0, 7, 8 OR 9, SKIP TO D1.** You indicated that you made [# C18] flight(s) on which you conducted an instrument approach to landing in I.M.C during the last 60 days. (How many of these approaches were/Was this approach) conducted under FAR part 91?

INSTRUMENT PART 91 ..... ___

IF 0, SKIP TO D1.

GC20. As you may know, the F.A.A currently allows pilots flying under FAR Part 91 to conduct instrument approaches, but not landings, when the weather conditions at the instrument approach landing facility are below landing minimums.

A. Are you aware of these regulations?

YES 1
NO 0
RF 7
DK 8

B. You just indicated that you made [# C19] instrument approach[es] in I.M.C and under FAR Part 91 during the last 60 days. (How many of those times did you fly the/Did you fly that) approach with the reported weather conditions **below** the minimums for that approach as allowed by the F.A.A?

INSTRUMENT BELOW MIN ..... ___
RF 997
DK 998

C. (On the most recent/On that) approach did the airport have on-site weather reporting?

YES 1
NO 0
RF 7
DK 8

D. (During how many of those approaches/During the approach) was the weather above the minimums when you landed?

INSTRUMENT BELOW MIN LAND ..... ___

S1 Have you flown as a commercial pilot during the last 60 days? Please do not include non-commercial flight time such as military or recreational flying.

NO ..... (SKIP TO S2) 0
YES ..... (CONTINUE) 1

S1A Was any of this commercial flying conducted as an air carrier pilot or copilot flying under FAR Part 121?

NO ..... (ASK S1B) 0
YES ..... (CODE S4=1, ASK S1B) 1

S1B Was any of this commercial flying conducted as a pilot or copilot flying a fixed wing aircraft for air taxi or other operations under FAR Part 135?

NO ..... (ASK S2) 0
YES ..... (CODE S4=2, SKIP TO S3) 1

S2 During the last 60 days, did you fly a fixed-wing airplane as a civilian, non-commercial, general aviation pilot or copilot logging hours under FAR Part 91?

NOTE TO INTERVIEWER: COPILOT LOGGING HOURS MEANS THAT S/HE FLEW AS A COPILOT AND LOGGED HOURS IN HIS/HER OFFICIAL FAA LOGBOOK.

NO ..... (CONTINUE) 0
YES ..... (CODE S4=2, GO TO S3) 1

S3 During the last 60 days, have you flown as a pilot or copilot logging hours on a civilian helicopter?

NO ..... (CONTINUE) 0
YES ..... (CODE S4=3) 1

S4 FLIGHT MODE CHECKPOINTS

AIR CARRIER 1
AIRPLANE 2
HELICOPTER 3

S5 SELECT ROUTING: FOLLOW FIRST INSTRUCTION THAT APPLIES

NOT ELIGIBLE: NOTHING CODED IN S4—
GO TO TERMINATION SCRIPT 1

ELIGIBILITY IN ONE ROUTE ONLY: ONLY 1 FLIGHT MODE CHECKED, FOLLOW CHECKED ROUTE 2

ELIGIBLE IN TWO OR MORE ROUTES:
CHECK IN TWO OR MORE FLIGHT MODES;
RANDOMLY ASSIGN ROUTE 3

S6 ROUTE ASSIGNMENT:

IF S5=3, ROUTE RANDOMLY ASSIGNED ELECTRONICALLY

AC INTERVIEW 1
GA INTERVIEW, AIRPLANE ROUTE 2
GA INTERVIEW, HELICOPTER ROUTE 3

CONTINUE WITH SCHEDULING INTERVIEW.

TERMINATION SCRIPT: I'm sorry, but your recent flight experience does not meet our survey requirements. Thank you for your assistance.

TIME BEGUN ..... (MILITARY)..... |__|__|:|__|__|

(FILLS)

INTERVIEWER: DATE OF INTERVIEW IS BEING RECORDED AS (START DATE).

IS THIS THE CORRECT DATE:

NO.....(RECORD DATE OF INTERVIEW)..... 0
YES..... 1

START DATE ..... |__|__|/|__|__|/|__|__|
MONTH DAY YEAR

START DATE = 60 DAYS BEFORE END DATE

END DATE..... |__|__|/|__|__|/|__|__|
(FILLS) MONTH DAY YEAR

END DATE = DAY BEFORE DAY OF INTERVIEW

SECTION A: BACKGROUND QUESTIONS

INTRODUCTION: I'm going to begin the interview with a few questions about your general flying experience.

GA1. Do you hold an A.T.P certificate or instrument rating?

ATP=AIRLINE TRANSPORT PILOT

NO..... (SKIP TO A2) 0
YES.....(ASK A) 1
RF ..... (SKIP TO A2) 7
DK ..... (SKIP TO A2) 8

A. Are you I.F.R. current?

IFR = INSTRUMENT FLIGHT RULES

NO.....0
YES.....1
RF 7
DK 8

GA2. During your **life,** approximately how many **hours in total** have you flown as a pilot? Include all types of flying including FAR Part 121 air carrier operations, air taxi or other operations under FAR Part 135, general aviation flying under FAR Part 91, as well as military service and ultralight flying.

TOTAL HOURS DURING LIFE..... |__|__|,|__|__|__|
RF 99 997
DK 99 998

INTRODUCTION: The rest of the questions will refer to your flying experience during the last 60 days prior to today. Whenever I say the "last 60 days," I am referring to the period from (START DATE) through (END DATE). Also, for all these questions, I will be asking you about events when you flew as a pilot in command or copilot logging hours in your official FAA logbook under FAR Part 121, Part 135 or Part 91. First I would like to ask a few questions about the type of flying you have done in the last 60 days.

GA3. During the last 60 days, how many **hours** did you fly as a pilot or copilot under FAR Part 121, Part 135, or Part 91?

DO NOT INCLUDE MILITARY OR ULTRALIGHT FLYING HERE.

TOTAL HOURS FLOWN LAST 60 DAYS ..... |_|_|_|
NO HOURS: TERMINATE INTERVIEW, CODE "NOT ELIGIBLE."

IF HOURS IN A3 ARE ABOVE 300, ASK A. OTHER RESPONSES SKIP TO A4

A. I'd just like to verify. You said you flew (# A3) **hours** during the last 60 days. Is this correct?

NO ..... (ASK B)
YES..... (SKIP TO A4)
RF ..... (SKIP TO A4)
DK..... (SKIP TO A4)

B. During the last 60 days, how many **hours** did you fly?

AS A PILOT OR COPILOT UNDER FAR PART 121, PART 135 OR PART 91.

HOURS..... |_|_|_|
RF 99
DK..... 99

GA4 **IF S4 DOES NOT = 1, SKIP TO GA5.**
How many of these (# A3 OR A3B) hours did you fly as an airplane pilot or copilot **under FAR Part 121 air carrier operations**?

OF HOURS FAR PART 121 ..... |_|_|_|
RF 99
DK..... 99

HOURS CANNOT EXCEED HOURS IN A3/A3B.

FAR PART 121 REGULATIONS GOVERN THE SCHEDULED FLIGHT OPERATIONS OF COMMERCIAL AIRLINES AND AIR CARRIERS. PART 121 COVERS LARGE JET OR PROPELLER-DRIVEN AIRCRAFT WITH A SEATING CAPACITY OF MORE THAN 30 PASSENGERS AND/OR OVER 12,500 LBS GROSS WEIGHT.

GA5 How many of these (# A3 OR A3B) hours did you fly as a pilot or copilot **for air taxi or other operations under FAR Part 135?**

HOURS UNDER FAR 135..... |_|_|_|
RF 99
DK..... 99

HOURS CANNOT EXCEED HOURS IN A3/A3B MINUS A4. IF >0, ASK A. OTHERS, INCLUDING 997 AND 998, SKIP TO A6.

FAR PART 135 REGULATIONS GOVERN THE FLIGHT OPERATIONS OF THE SMALL (LESS THAN 12,500 LBS GROSS WEIGHT) COMMUTER AIRLINES AND AIR TAXI SERVICES. ALL UNSCHEDULED PASSENGER OR CARGO OPERATIONS ARE COVERED UNDER PART 135.

A. Of the (# A5) hours flown under Part 135, how many occurred in fixed-wing airplanes?

HOURS FAR 135 AIRPLANE..... |_|_|_|
RF 99
DK..... 99

HOURS CANNOT EXCEED HOURS IN A5.
IF A5A= A5, SKIP TO A6.
IF <A5, 997 OR 998, ASK A5B.

B. Of the (# A5) hours flown under Part 135, how many occurred in helicopters?

HOURS FAR 135 HELICOPTER..... ___
RF.....99
DK.....99

HOURS CANNOT EXCEED HOURS IN A5 MINUS A5A.

GA6. How many of these (# A3 OR A3B) hours did you fly as a general aviation pilot or copilot under FAR Part 91?

HOURS UNDER FAR 91 ..... ⌊_⌊_⌊_⌋
RF 997
DK 998

HOURS CANNOT EXCEED HOURS IN A3/A3B MINUS SUM (A4 PLUS A5).
IF >0, ASK A. OTHERS, INCLUDING 997 AND 998, SKIP TO A7.

FAR PART 91 REGULATIONS COVER BASIC AND GENERAL RULES FOR ALL AIRCRAFT OPERATIONS. PART 91 GOVERNS THE OPERATION OF BUSINESS AIRCRAFT AND AIRCRAFT USED BY GENERAL AVIATION PILOTS WHO FLY FOR PLEASURE.

A. Of the (# A6) hours flown under Part 91, how many occurred in fixed-wing airplanes?

HOURS FAR 91 AIRPLANE ..... ⌊_⌊_⌊_⌋
RF 997
DK 998

HOURS CANNOT EXCEED HOURS IN A6.
IF A6A= A6, SKIP TO A7.
IF <A6, 997 OR 998, ASK A6B.

B. Of the (# A6) hours flown under Part 91, how many occurred in helicopters?

HOURS FAR 91 HELICOPTER ..... ⌊_⌊_⌊_⌋
RF 997
DK 998

HOURS CANNOT EXCEED HOURS IN A6 MINUS A6A.

INTRODUCTION: Now I'd like to ask a few questions about the number of **takeoffs or flights** you made during the last 60 days. We use the terms "flight" throughout this interview to mean the period of time between each takeoff and landing, even if that time is short such as for instructors teaching students to land and "touch and goes." READ A7-A11 WHEN APPLICABLE.

TOUCH AND GOES = VERY SHORT FLIGHTS WHEN PRACTICING TAKEOFFS AND LANDINGS.

GA7. **IF A4 = 0, 7, OR 8, SKIPT TO A8. IF A4 > 0, READ:** During the (# A4) hours you flew as an **airplane pilot or copilot under FAR Part 121**, how many distinct **flight legs** did you experience?

OF LEGS/TAKEOFFS PART 121 ..... ⌊_⌊_⌊_⌋
RF 997
DK 998

GA8. **IF A5A = 0, 7, OR 8, SKIP TO A9. IF A5A > 0, READ:** During the (# A5A) hours you flew as an **airplane pilot or copilot under FAR Part 135,** how many **takeoffs** did you experience?

PART 135 AIRPLANE TAKEOFFS ..... ⌊_⌊_⌊_⌋
RF 997
DK 998

IF A8 BLANK, 0, 997 OR 998, SKIP TO A9.

A. (For how many of these (# A8) flights/For this flight) were you the pilot in command?

PART 135 AIRPLANE PILOT IN COMMAND ..... ⌊_⌊_⌊_⌋
RF 997
DK 998

MUST BE EQUAL TO OR LESS THAN A8.

B. (How many of these (# A8) flights occurred/Did this flight occur) either all or in part during nighttime conditions?

PART 135 AIRPLANE FLIGHTS NIGHT ..... ⌊_⌊_⌊_⌋
RF 997
DK 998

MUST BE EQUAL TO OR LESS THAN A8.

C. (How many of these (# A8) flights occurred/Did this flight occur) under an I.F.R. flight plan?

IFR = INSTRUMENT FLIGHT RULES

PART 135 AIRPLANE IRF FLIGHTPLAN ..... ___
RF 997
DK 998

MUST BE EQUAL TO OR LESS THAN A8.

D. (How many of these (# A8) flights were/Was this flight) 50 nautical miles or more in length?

PART 135 AIRPLANE FLIGHTS LONG ..... ___
RF 997
DK 998

MUST BE EQUAL TO OR LESS THAN A8.

E. (How many of these (# A8) flights were/Was this flight) to or from international destinations other than Canada?

PART 135 AIRPLANE INTERNATIONAL ..... ___
RF 997
DK 998

MUST BE EQUAL TO OR LESS THAN A8.

GA9. **IF A5B = 0, 7, OR 8, SKIP TO A10. IF A5B > 0, READ:** During the (# A5B) hours you flew as a **helicopter pilot or copilot under FAR Part 135,** how many **takeoffs** did you experience?

PART 135 HELICOPTER TAKEOFFS ..... ___
RF 997
DK 998

IF A9 BLANK, 0, 997 OR 998, SKIP TO A10.

A. (For how many of these (# A9) flights/For this flight) were you the pilot in command?

PART 135 PILOT IN COMMAND ..... ___
RF 997
DK 998

MUST BE EQUAL TO OR LESS THAN A9.

B. (How many of these (# A9) flights occurred/Did this flight occur) either all or in part during nighttime conditions?

PART 135 HELICOPTER FLIGHTS NIGHT ..... ___
RF 997
DK 998

MUST BE EQUAL TO OR LESS THAN A9.

C. (How many of these (# A9) flights occurred/Did this flight occur) under an I.F.R. flight plan?

IFR = INSTRUMENT FLIGHT RULES

PART 135 HELICOPTER FLIGHTPLAN ..... ___
RF 997
DK 998

MUST BE EQUAL TO OR LESS THAN A9.

D. (How many of these (# A9) flights were/Was this flight) 50 nautical miles or more in length?

PART 135 HELICOPTER FLIGHTS LONG ..... ___
RF 997
DK 998

MUST BE EQUAL TO OR LESS THAN A9.

E. (How many of these (# A9) flights were/Was this flight) to or from international destinations other than Canada?

PART 135 HELICOPTER INTERNATIONAL ..... ___
RF 997
DK 998

MUST BE EQUAL TO OR LESS THAN A9.

GA10. **IF A6A = 0, 7, OR 8, SKIP TO A11. IF A6A > 0, READ:** During the (# A6A) hours you flew as an **airplane pilot or copilot under FAR Part 91,** how many **takeoffs** did you experience?

PART 135 HELICOPTER TAKEOFFS ..... ___
RF 997
DK 998

IF A10 BLANK, 0, 997 OR 998, SKIP TO A11.

A. (For how many of these (# A10) flights/For this flight) were you the pilot in command?

PART 91 AIRPLANE PILOT IN COMMAND ..... ___
RF 997
DK 998

MUST BE EQUAL TO OR LESS THAN A10.

B. (How many of these (# A10) flights occurred/Did this flight occur) either all or in part during nighttime conditions?

PART 91 AIRPLANE FLIGHTS NIGHT ..... ___
RF 997
DK 998

MUST BE EQUAL TO OR LESS THAN A10.

C. (How many of these (# A10) flights occurred/Did this flight occur) under an I.F.R. flight plan?

IFR = INSTRUMENT FLIGHT RULES

PART 91 AIRPLANE FLIGHTPLAN ..... ___
RF 997
DK 998

MUST BE EQUAL TO OR LESS THAN A10.

D. (How many of these (# A10) flights were/Was this flight) 50 nautical miles or more in length?

PART 91 AIRPLANE FLIGHTS LONG ..... ___
RF 997
DK 998

MUST BE EQUAL TO OR LESS THAN A10.

E. (How many of these (# A10) flights were/Was this flight) to or from international destinations other than Canada?

PART 91 AIRPLANE INTERNATIONAL ..... ___
RF 997
DK 998

MUST BE EQUAL TO OR LESS THAN A10.

GA11. **IF A6B = 0, 7, OR 8, SKIP TO A12. IF A6B > 0, READ:** During the (# A6B) hours you flew as a **helicopter pilot or copilot under FAR Part 91,** how many **takeoffs** did you experience?

PART 91 HELICOPTER TAKEOFFS ..... ___
RF 997
DK 998

IF A11 BLANK, 0, 997 OR 998, SKIP TO A12.

A. (For how many of these (# A11) flights/For this flight) were you the pilot in command?

PART 91 PILOT IN COMMAND ..... ___
RF 997
DK 998

MUST BE EQUAL TO OR LESS THAN A11.

B. (How many of these (# A11) flights occurred/Did this flight occur) either all or in part during nighttime conditions?

PART 91 HELICOPTER FLIGHTS NIGHT ..... ___
RF 997
DK 998

MUST BE EQUAL TO OR LESS THAN A11.

C. (How many of these (# A11) flights occurred/Did this flight occur) under an I.F.R. flight plan?

IFR = INSTRUMENT FLIGHT RULES

PART 91 HELICOPTER FLIGHTPLAN ..... ___
RF 997
DK 998

MUST BE EQUAL TO OR LESS THAN A11.

D. (How many of these (# A11) flights were/Was this flight) 50 nautical miles or more in length?

PART 91 HELICOPTER FLIGHTS LONG ..... ___
RF 997
DK 998

MUST BE EQUAL TO OR LESS THAN A11.

E. (How many of these (# A11) flights were/Was this flight) to or from international destinations other than Canada?

PART 91 HELICOPTER INTERNATIONAL..... |_|_|_|
RF..... 997
DK..... 998

MUST BE EQUAL TO OR LESS THAN A11.

INTRODUCTION:
Earlier you indicated that during the last 60 days you flew (A5A+A6A OR A5B+A6B) hours as (an airplane/ a helicopter) pilot or copilot flying under FAR (Part 135/Part 91/Part 135 and Part 91). For the rest of the interview, I will be asking you about your experiences flying (airplanes/helicopters) during this period of time.

GA12. I am now going to read a list of different types of general aviation flying. Please tell me if those (# A5A+A6A OR A5B+A6B) hours involved any of these types of flying. Did you undertake any (airplane/ helicopter) flights (READ CATEGORIES)?

		NO	YES *(ASK COL 1)*	RF	DK	COL 1: Approximately how many hours would you say was devoted to (BOLD WORDS IN A9a-g)?
A.	for **flight instruction as the instructor?** ..... NOTE: INCLUDES CHECKOUT FLIGHTS	0	1	7	8	|_|_|_|
B.	for **flight instruction as the student?** ..... NOTE: INCLUDES CHECKOUT FLIGHTS	0	1	7	8	|_|_|_|
C.	for **corporate transportation** as a pilot employee of a corporate flight department?..... NOTE: DOES NOT INCLUDE CHARTER FLIGHTS	0	1	7	8	|_|_|_|
D.	as part of **your own business activities?**.....	0	1	7	8	|_|_|_|
E.	for **government or public purposes** in aircraft owned or operated by government entities, sometimes called public use flights?.....	0	1	7	8	|_|_|_|
F.	with **paying passengers**, also known as revenue passengers?	0	1	7	8	|_|_|_|
G.	for **cargo or freight** transportation without any paying passengers?	0	1	7	8	|_|_|_|
H.	for **transporting patients or critical medical products** such as organs for transplant or blood? .	0	1	7	8	|_|_|_|
I.	for **recreation or personal transportation** not associated with business?.....	0	1	7	8	|_|_|_|
J.	for any other purpose?	0	1	7	8	|_|_|_|

1. What was the purpose? SPECIFY VERBATIM: _____

GA13 For the (# A5A+A6A OR A5B+A6B) hours you flew as (an airplane/a helicopter) pilot or copilot under FAR (Part 135/Part 91/Part 135 and Part 91) in the last 60 days, please tell me all of the (airplane/helicopter) makes and models you flew. RECORD VERBATIM. **LIST ALL MODELS THEN ASK COLUMNS A AND B FOR EACH.**

ASK COLUMN C ONLY IF NO MAKE/MODEL MATCH IN DROP DOWN SCREEN

	A.	B.	C.			
MAKE/MODEL (IDENTIFY FROM DROP-DOWN LIST. IF NOT ON LIST, RECORD VERBATIM)	During the last 60 days, how many hours did you fly the (MAKE/ MODEL)? HOURS SHOULD EQUAL SUM OF A5A + A6A, OR A5B + A6B.	How many engines does this aircraft have?	Is this an experimental airplane?			
			NO	**YES**	**RF**	**DK**
1. _____	⌊_⌊_⌊_	⌊_⌊_⌊_	0	1	7	8
2. _____	⌊_⌊_⌊_	⌊_⌊_⌊_	0	1	7	8
3. _____	⌊_⌊_⌊_	⌊_⌊_⌊_	0	1	7	8
4. _____	⌊_⌊_⌊_	⌊_⌊_⌊_	0	1	7	8
5. _____	⌊_⌊_⌊_	⌊_⌊_⌊_	0	1	7	8
6. _____	⌊_⌊_⌊_	⌊_⌊_⌊_	0	1	7	8

Presentations at Government Events

Date	Location	Audience	Subject	Includes Preliminary Data	Comment
1998-03-05		ASIST Process Team?	NAOMS Concept	No	
2000-01-26		AvSPEC	Program Overview; Partial Field Trial Results	Yes	as of January with planned conclusion by February 2000.
2002-08-28	Ames	NASA Ames, ICAC Contractors	ICAC Results	Yes	
2002-12-05	Langley	NASA Langley Lewis-Finelli	Program Overview; Preliminary Results	Yes	Status report on results to date.
2003-04-09	DC	FAA Senior Management	Detailed Program View; Results to Date	Yes	Shares air carrier data collection results.
2003-05-07	Ames	NRC Review Committee	NAOMS Program Review	Yes	Describes organization chart and contractor roles.
2003-08-05	Newport, RI	FAA-JIMDAT	NAOMS Overview and Status	Yes	
2004-06-16	San Francisc	CAST-JIMDAT	Construction of JIMDAT Section C	No	Enhancements shown, as well as additional 21 committed JIMDAT Safety Enhancements were described.
2004-09-01	DC	FAA ATO	Program Overview, Section C ICAC Results	Yes	Overview of data described, and request to ATO Office of Performance Analysis to join in with NAOMS.
2004-09-08	Ames	LaPointe-FAA Tech Center	Program Overview	Yes	Data briefing.
2005-01-26	DC	CAST-JIMDAT	JIMDAT Section C Results	Yes	Data analysis report.
2005-01-28	DC	CAST	JIMDAT Section C Results	Yes	Data analysis report.

Presentations at Public Events

1998-11-13		NASA ASRS Advisory Subcomittee	Development Approach	No	
1999-05-11	DC	Invited Stakeholders	NAOMS Workshop 1	No	
2000-03-01	DC	Invited Stakeholders	NAOMS Workshop 2	Yes	Data briefing.
2003-12-18	Seattle	NAOMS Working Group	Meeting 1, NAOMS Status and Results Review	Yes	Data briefing.
2004-05-05	DC	NAOMS Working Group	Meeting 2, NAOMS Status and Results Review	Yes	"Comparison Charts.xls" is an unvetted internal working document; believe that if was reviewed internally before the presentation but don't recall presenting it to WG. Data briefing.

Workshop on the Concept of the

NATIONAL AVIATION OPERATIONAL MONITORING SERVICE (NAOMS)

May 11, 1999

WELCOME AND NAOMS INTRODUCTION

Linda Connell

NASA Project Manager, Level III

Background

- **White House Commission on Aviation Safety and Security (Gore Commission)**
  - Called for 80% reduction in fatal accidents in 10 years
  - Encouraged NASA to actively participate
- **In 1998, NASA initiated a multi-year aviation safety program to support the Commission goal**
- **Focused Aviation Safety Program (AvSP)**
  - Formally begins FY00
- **NASA Aviation Operations Systems (AOS)**
  - Has supported ramp up activities in FY98 and FY99

AvSP Organization

Aviation Safety Program

Aviation Safety Program Office

Mike Lewis, Director

George Finelli, Dep Dir
Frank Jones, Asst Tech Mgmt
Connie Smith, Secretary
Cynthia Null, Dep Dir (ARC)
Jai Shin, Dep Dir (LeRC)
James Yamanaka, Dep Dir (DFRC)

Level 1 Program

1.1 Technical Integration
Vince Schultz (LaRC)

1.2 Program Integration
Mike Basehore (FAA)
Carrie Walker (LaRC)
Mike Durham (LaRC)

Level 2 Elements

2.1 Aviation System Monitoring & Modeling
Yuri Gawdiak (ARC)

- System Monitoring
- Data Sharing
- Data Analysis

2.2 System-Wide Accident Prevention
Dave Foyle (ARC)

- Human Error Modeling
- Maintenance Human Factors
- Training

2.3 Single Aircraft Accident Prevention
John White (LaRC)

- Health Management & Flt Crit Sys Design
- Precision Approach & Landing Info
- Control Upset Mgmt
- Engine Containment
- Flight Integration

2.4 Weather Accident Prevention
Ron Colantonio (LeRC)

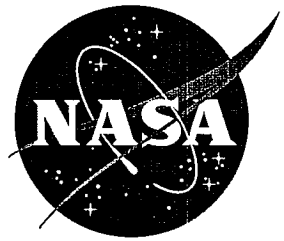
- Wx Info Distribution & Presentation
- Synthetic Vision Display
- Turbulence Detection & Mitigation

2.5 Accident Mitigation
Doug Rohn (LeRC)

- Systems Approach to Crashworthiness
- Fire Prevention

Level 3 Projects

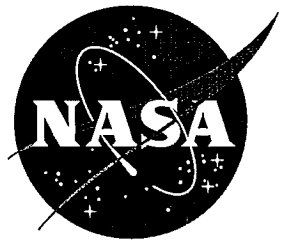
NASA Aviation Safety Program Opportunities and Challenges



- Opportunity: to intensify national efforts to maintain our nations outstanding aviation safety record
- Challenge: to maintain this record as traffic grows in coming years

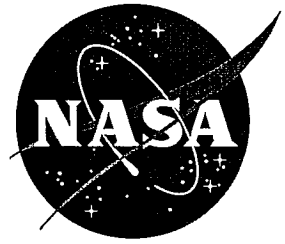
We need to be able to accurately measure progress towards the goal stated by the Gore Commission

Measurement Objectives



- **Better, more comprehensive numbers to**
  - Measure progress towards the safety improvement goal
- **Better and more rapid feedback on technological and procedural change**
  - Measure the effects of AvSP and related technologies as they are introduced to the aviation system
- **Escape from event-driven safety policy**
  - The accident *du jour* response syndrome
  - By giving policy makers a more secure sense of the safety state of the national aviation system
- **Create a data-driven basis for safety decisions**

Desired Measurement Characteristics

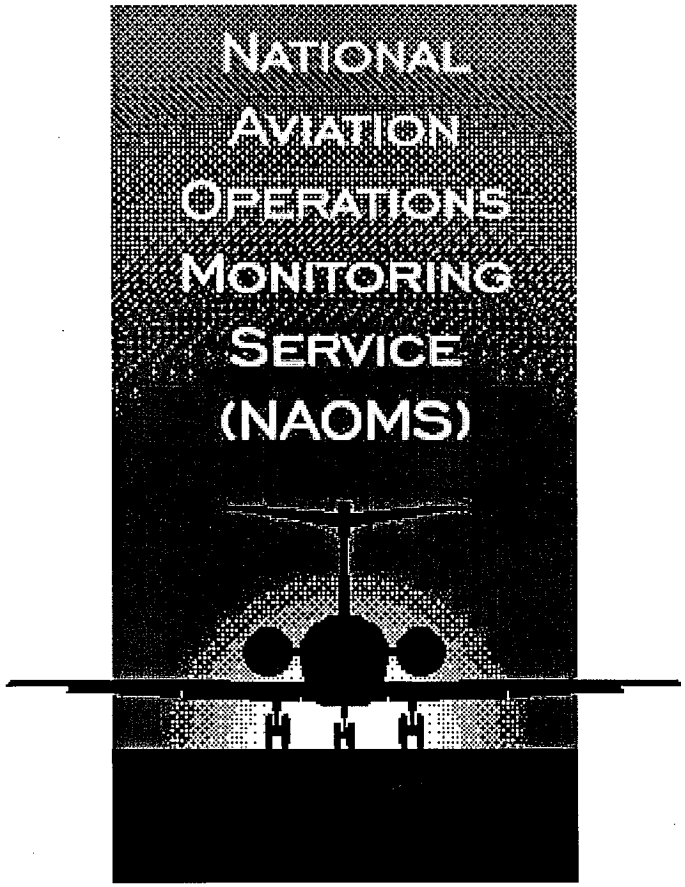


- System-wide
- Operationally focused
- Timely
- Reliable
- Valid
- Flexible
- User accepted

Existing Capabilities

- **A number of valuable publicly available data collection programs already exist**
  - SDR / OpError / AIDS
  - ASRS
  - NTSB database
  - And others
- **These data collection efforts satisfy many needs**
- **But they do not provide**
  - An adequate top down view of long-term NAS safety trends
  - An effective means of measuring the impacts of new aviation technologies and procedures

NAOMS Workshop



March 1, 2000

NAOMS CONCEPT, RATIONALE and FIELD TRIAL DEVELOPMENT

Robert Dodd Sc.D., M.S.

Principal Investigator,
Battelle

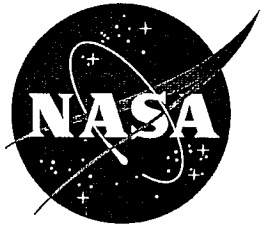
NAOMS Goals

Create a new capability that will:

1) Track aviation safety trends

2) Monitor the impacts of technological and procedural changes to the aviation system

NAOMS: Filling Important Data Gaps



- **NAOMS will not replace or duplicate current data collection efforts**
- **Designed to supplement current and future aviation safety data collection and analysis programs**
- **Will obtain accurate information from operational personnel**
  - Includes groups who traditionally have not been active sources of safety information

NAOMS Approach

- **Regularly survey pilots, controllers, mechanics, flight attendants and others who operate the national aviation system (NAS)**
  - View the national aviation system through their eyes
  - Includes all types of operations (air carrier, regional, corporate, general aviation, military)
- **Achieve scientific integrity by using well crafted survey instruments and carefully designed statistical sampling methods**

NAOMS
Will Collect Data on

Participant Experiences involving . . .

☆ **Aviation Operations (exposure)**
- Flight hours / legs
- Time on control position
- Other pertinent measures

🕐 **Safety Events**
- A standard set of benchmark incidents

🕐 **New Technologies and Procedures**
- First-hand experiences
- Continuously refocused in response to changing needs

NAOMS Will Generate . . .

Statistically valid estimates of the actual rates of safety events and related experiences occurring in the NAS

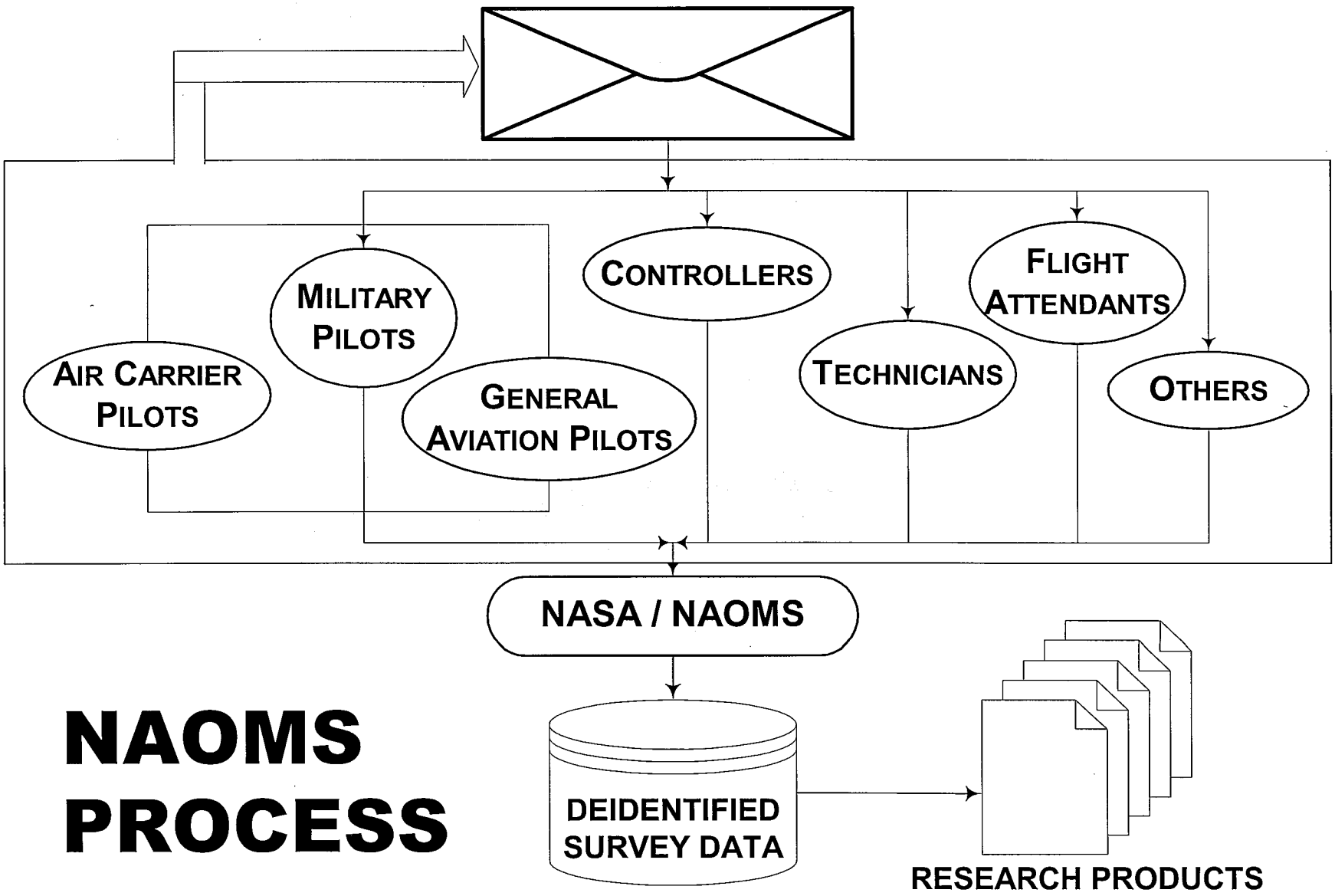
NAOMS Data Use

- **Used to track event trends**
  - Will identify incident trends
  - May not fully explain trends or causal factors
  - Additional investigation may be needed
  - NAOMS will complement, not replace existing data resources
- **Can provide detailed insight into topics of special interest**
  - Added to the questionnaire as needed
  - Can be accomplished relatively quickly

Why NAOMS Chose the Survey Method

- **Proven in other venues**
  - Public health
  - Public policy
  - Market research
- **Scientific and representative**
- **Capable of addressing human performance issues**
- **Timely data collection**
- **Well-developed methodologies**

NAOMS PROCESS



Participant Confidentiality is Assured

- We will have no means of tracing a survey response to the individual who provided it
- All tracking information is kept separate and destroyed after use
- No information is collected on operator name or airport name
- Reports and data sets will have no information that can be used to identify reporters

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NAOMS Will Collect Data on

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☆ **Aviation Operations (exposure)**

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- Time on control position
- Other pertinent measures

🕐 **Safety Events**

- A standard set of benchmark incidents

🕐 **New Technologies and Procedures**

- First-hand experiences
- Continuously refocused in response to changing needs

NAOMS Products

- **EXPECTED OUTPUTS**
  - Summarized aviation operational experience data
  - Statistically reliable estimates of incident rates
  - Near real-time feedback on impacts of new technology and procedures
- **PRODUCT CONSUMERS**
  - Decision makers (government and industry)
  - Safety professionals and research organizations

NAOMS: Field Trial Goals

- **Determine Feasibility of Concept**
  - Can survey research techniques provide meaningful levels of reporting on safety events from the aviation community?
  - If so, is this level of reporting sufficient for trending?
- **Thorough and comprehensive evaluation of survey methodology**
  - Based on solid science and the best knowledge on survey methodology
    - Mode, recall period, etc
    - Sample size requirements and costs

Field Trial Focus

Methodology:

NOT EVENTS

No event information will be presented or published from the field trial.

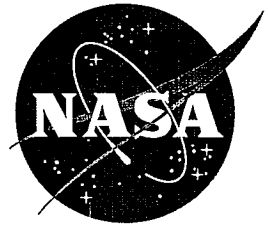
Activities to Date

- **Feasibility Assessment**
  - Background Research
    - Literature review
    - Participant group profiles
  - Field Research
    - Conducted multiple focus groups with pilots
      - Obtained extensive listing of safety experiences
      - Solicited input on their likely response to a NAOMS survey
    - Conducted individual evaluation of pilot respondents
      - Ability to recall events
      - Method of categorizing events
  - Briefed Government and Industry Organizations

Activities to Date (cont'd)

- **NASA Workshops**
  - November 97 and May 1999
  - Government, Industry and Academia
- **Survey Instrument Development**
  - Drafts Developed, Extensive Review
    - Focus groups
    - ASRS analysts
    - Workshop comments

Field Trial Survey Instrument Structure



- Section A: Operational Exposure
- Section B: Safety Event Experiences
- Section C: Focus Topics
- Section D: Participant Feedback

Field Trial Approach

- **Assessment of the survey instrument and procedures**
  - Limited to air carrier pilots
  - Various versions were tested
  - Last section of survey asked participants for feedback on survey and process
- **Variations**
  - Mode (telephone, mail, face-to-face)
  - Recall period
  - Section order
  - Topical foci

NAOMS Field Trial Products

- **Response rates, quality and completeness by**
  - Mode
  - Recall period
  - Question order
- **Feedback on survey from respondents**
- **Dimensions of a fully operational system**
  - Sample size requirements
  - Mode
  - Recall period
  - Cost

BASIC FINDINGS

- **NAOMS is a *very viable* method to collect aviation safety data**
- **Response to survey very positive**
  - Very high response rates
- **The results indicate the most effective and efficient way to apply the survey is via telephone interviewing**
  - 10 to 20% more expensive than mail but roughly comp....;
    - better response rate
    - better accuracy
    - better question completion
  - Most common method for other surveys

NATIONAL AVIATION OPERATIONS MONITORING SERVICE (NAOMS)

NAOMS
NATIONAL AVIATION OPERATIONS
MONITORING SERVICE

August 5, 2003

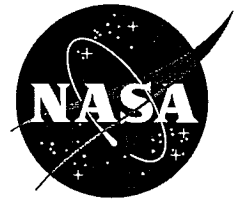
Purpose of Briefing

Precisely describe NAOMS development and purpose.

NAOMS Purpose

To fill an aviation safety data gap through the collection of primary and quantifiable safety data from pilots, air traffic controllers and others. The resulting data to be reliable, accurate and timely.

Foundation of NAOMS



- A number of databases attempt to capture safety-related information concerning the National Airspace System
- A number of databases attempt to capture safety-related information concerning specific parts of the NAS

No existing database addresses the health and safety of the NAS as a whole in a quantitatively defensible fashion.

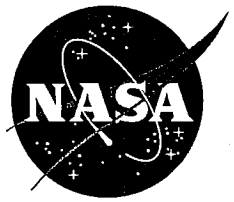
Expressed Need for Event Data

- **Multiple and consistent recommendations for improvement in aviation safety data systems**
  - **White House Commission on Aviation Safety and Security ("Gore Report")**
    - **"Most effective way to identify incidents and problems in aviation is for the people who operate the system (pilots, mechanics, controllers, dispatchers, etc) to self-disclose the information." (Page 13)**
  - **GAO Evaluation (Safer Skies Review, June 2000)**
    - **Additional performance measures required (by law)**
    - **Use precursors associated with past accidents to track safety baseline and improvements from interventions**
  - **NTSB (Safety Report on Transportation Safety Databases, 2002)**
    - **Over 19 recommendations for improvements in safety event reporting (1968-2001)**
    - **Need to address problem of under-reporting in current aviation safety data systems**
  - **FAA (internal studies, 2004 Strategic Plan draft)**
    - **Identify risks before they lead to accidents**

Survey Rationale

- Reliable and valid results
  - Must be designed and implemented according to established scientific protocols
  - Require high response rates
- Survey methodology widely used by industry and government policy makers
- Many Federal programs use data for safety and management decisions
  - DOT Omnibus Transportation Survey
    - Telephone, monthly, ongoing, all households, 1,000 interviews per month
  - National Household Travel Survey (NHTS)
    - Telephone, 40,000 households, every five years
  - Commodity Flow Survey
    - Telephone, shippers of domestic products, every five years, over 100 k sampled each time survey applied

Key NAOMS Characteristics



- Quantitative
- System-wide
- Representative and inclusive
- Timely
- Statistically and scientifically valid
- Flexible (Section C)

Goals

1. Track aviation safety trends
2. Monitor the impacts of technological and procedural changes to the aviation system
3. Encourage emphasis on areas where improvements could have the greatest impact
4. Contribute to the development of a data-driven basis for safety decisions
   - Through integration of findings through industry and government groups

AVSP AVIATION SAFETY PROGRAM NASA/FAA

Survey Approach

- Regularly survey pilots, controllers, mechanics, flight attendants and others who operate in the NAS
- View the national aviation system through their eyes (primary data)
- Includes all types of operations (air carrier, regional, corporate, general aviation)
- Collect data on events directly experienced by respondents
- Guarantee confidentiality
- Achieve scientific integrity by using well crafted survey instruments and statistical analysis methods

Focus

NAOMS measures <u>event occurrence,</u> not causes. Notable trends or findings require *additional* investigation.

AVSP AVIATION SAFETY PROGRAM NASA/FAA

NAOMS Team

NASA Managers

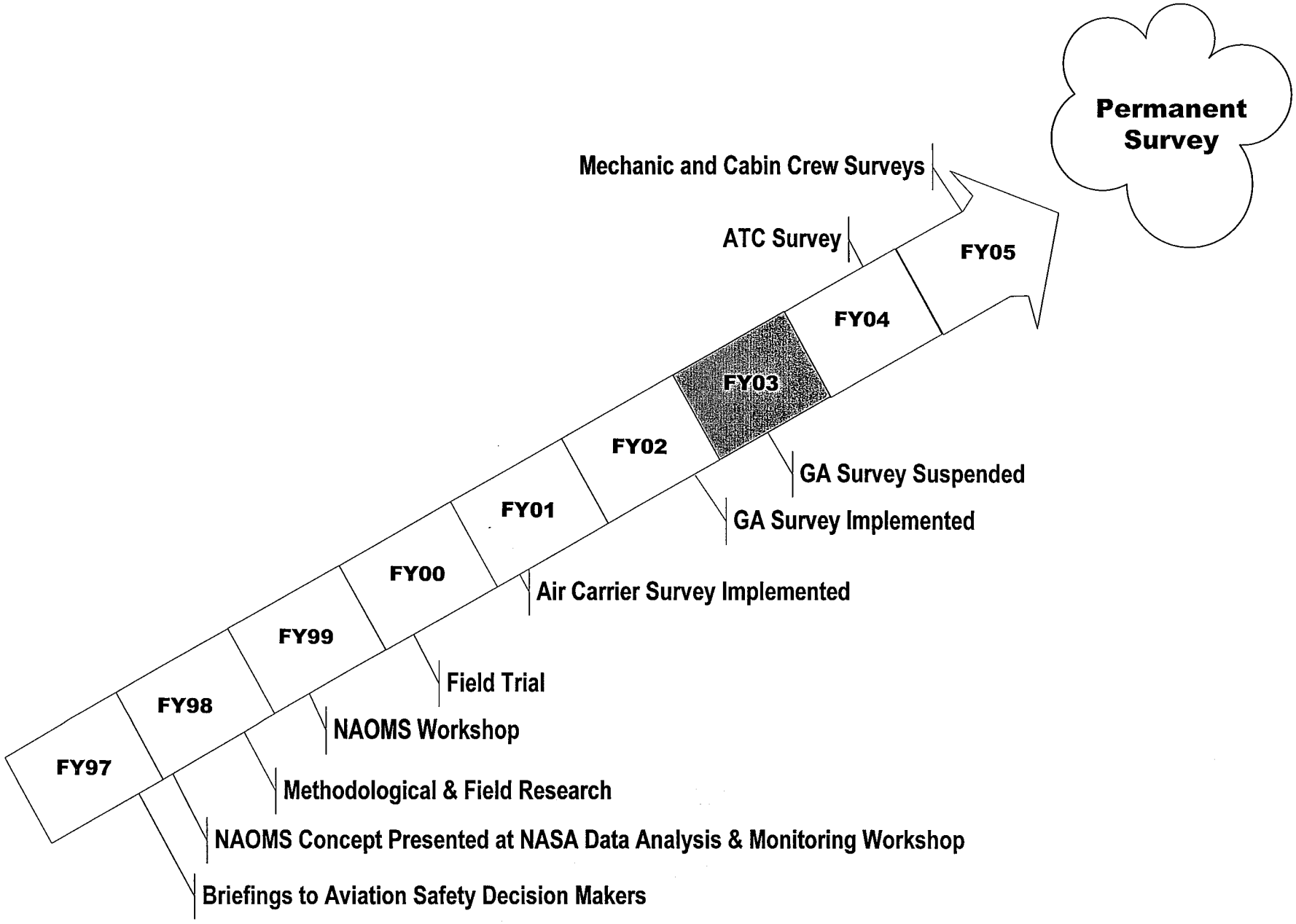
- **Mary Connors** — **AvSP, Level 3**
- **Linda Connell** — **AvSP, Level 3**

Battelle Support Service Contract to NASA

- **Loren Rosenthal** — **Battelle Manager**
- **Robert Dodd** — **Principal Investigator**
- **Jon Krosnick** — **Survey Methodologist**
- **Mike Silver** — **Survey Methodologist**
- **Joan Cwi** — **Survey Application**
- **T. Ferryman** — **Statistician**
- **Bruce Ellis** — **Statistician**
- **Mike Jobanek** — **Aviation Safety Analyst**

NAOMS Development

- **Initial program planning started in FY 1997**
- **Part of the NASA's AvSP program**
  - Method for evaluating impact of AvSP interventions
- **Extensive briefings and workshops to FAA and industry through all phases**
- **Development process and OMB approvals were comprehensive, rigorous and labor intensive**
  - Required Federal Register Notices (FRN)
- **Routine data collection began with air carrier pilots in April 2001**


Permanent Survey
Mechanic and Cabin Crew Surveys
ATC Survey
FY05
FY04
FY03
FY02
FY01
FY00
FY99
FY98
FY97
GA Survey Suspended
GA Survey Implemented
Air Carrier Survey Implemented
Field Trial
NAOMS Workshop
Methodological & Field Research
NAOMS Concept Presented at NASA Data Analysis & Monitoring Workshop
Briefings to Aviation Safety Decision Makers

NAOMS Development: Survey Content

- Reviewed literature, safety data systems and past surveys
  - ASRS, NTSB, AIDS, NAIMS, FOQA programs, other
  - 43 of 62 core questions associated with past air carrier accidents
- Conducted four ALPA supported focus groups
  - 36 active air carrier pilots
  - Gained insight into safety problems that concern active line pilots
  - Gained insight into their opinion of possible survey
- (Also conducted 3 NATCA sponsored focus groups with 27 controllers)

NAOMS Development: Organization and Form

- **Conducted ALPA supported experimental research with active line pilots to determine**
  - **How well pilots remember (period of recall)**
  - **How pilots organized memory of safety events (questionnaire organization)**
  - **Survey "talk-aloud" tests (individual pilots provide real time criticism of questionnaire content and structure)**
- **Developed a draft survey that was**
  - **Extensively edited and corrected for non-technical wording by survey method experts**
  - **Edited and corrected for technical accuracy by aviation subject matter experts**

Extensive and detailed up-front effort devoted to questionnaire development.

Pre-Field Trial Industry and Government Workshop

- **May 1999 – Pre Field Trial Workshop in Alexandria, VA**
- **Goals of workshop**
  - Described program and solicited input
  - Presented draft questionnaire and asked for comments
- **Participants**
  - Industry and government invited, 52 participants
  - All major organizations represented including FAA, NTSB, ALPA, ATA, etc
- **Comments**
  - Working groups developed for comments
  - Comments provided and summarized
  - FAA conducted internal survey and provided summary comments

NAOMS Development: Field Trial

- Survey was tested in a field trial among 630 active air carrier pilots to determine its suitability and to discover weaknesses or flaws
- Pilots in field trial were asked to provide input into areas that were unclear, needed improvement, or topics that should be dropped or added
- Findings from field trial used to further edit and revise questionnaire

Post-Field Trial Industry and Government Workshop

March 2000 – Post Field Trial Workshop in Washington D.C.

- **Goal of workshop**
  - Presented findings from field trial
  - Described next steps of program
  - Obtained additional input from industry and government organizations
- **Participants**
  - Industry and government invited, 39 participants
  - All major organizations represented including FAA, NTSB, ALPA, ATA, etc
- **Summary of results**
  - Comments provided and summarized

Survey Initiation

- **Air Transport Pilots initial group**
- **60-day recall period; telephone interviews**
- **8,000 interviews/year**
- **Questionnaire Content**
  - Section A - Demographics/experience
  - Section B - Core questions of study; consistent data set over time
  - Section C - Focused topics to be driven by government/industry high priority needs, changes over time
  - Section D - Questionnaire Feedback

Statistical Approach: Rate Development

- **Numerator: safety event counts**
- **Denominator: risk exposure**
  - Flight hours (events that can occur any time during flight)
  - Flight legs (events that occur mainly during terminal operations)
- **NAOMS collects data for the numerator (events) and denominator (exposure) at the same time**
- **Rates developed for aircraft size groups**
  - Small transport (<100 k# GTOW)
  - Medium transport (≥ 100 k# and < 200 k# GTOW)
  - Large transport (> 200 k# GTOW with single aisle)
  - Wide-body (> 200 k# GTOW with two aisles)
- **Confidence intervals are calculated for all rates**

Statistical Approach: Quality Assurance

- **NAOMS has QA checks during many steps during data collection and analysis process**
- **CATI (computer aided telephone interviewing) software used at data collection to minimize data entry errors**
  - Range checks on quantities
  - Valid value check on fixed fields
- **Second stage QA occurs during data processing**
  - Second validation check
  - Check for outliers (roughly 0.5% of data is unreasonable)
- **Additional review and calculation of results done by NAOMS team statisticians to verify analyses**

Statistical Approach: Future Directions

Future data products to be determined by guidance from the NAOMS working group

Status

- **Air Carrier Pilots**
  - **Over 17,000 interviews**
  - **70% response rate**
  - **Interviews continue**
- **Over 4,000 interviews with General Aviation Pilots**
  - **Presently suspended**
- **Air Traffic Controller Survey scheduled for startup in FY- 04**

AVSP AVIATION SAFETY PROGRAM NASA/FAA

NAOMS Working Group

- **Purpose**
  - Ensure that all aspects of the NAOMS are and continue to be properly implemented and that results are valid and appropriate
  - Gain agreement concerning information release in terms of content, level, form, and timing
- **Industry and Government Groups**
  - Individuals recruited from all major industry and government; selected for their individual/team skills
- **Non-Disclosure/Confidentiality Agreement**
- **Ames Associates Program - Industry Participants**
  - No government compensation, no intellectual property rights, covered by Workmen's Compensation [by ARC]

Summary

- NAOMS measures the occurrence of events, not causes
- It is intended to serve the aviation industry as a whole
- The NAOMS survey is designed to expose areas that need further investigation
- Numerous briefings and workshops have been conducted with the aviation community
- Over 17,000 air carrier pilot surveys have been completed
- NAOMS meets the goal of a quantitative, statistically defensible, system-wide safety assessment tool, complementing other databases and assessment tools

AVSP AVIATION SAFETY PROGRAM NASA/FAA

FAA Participation

- Elements of the FAA have been involved in the NAOMS process from the beginning and at various stages in its development
- NASA has invited 2-3 FAA representatives serve on the NAOMS Working Group
- Encourage others within their organization to provide feedback through the NAOMS Working Group
- Lend support to NAOMS ATC survey effort
- Determine how the NAOMS results can best be used to support the FAA safety mission.

AVSP AVIATION SAFETY PROGRAM NASA/FAA

NARP

ederal Aviation Administration

2007 National Aviation Research Plan

February 2007

R&D ACTIVITIES

Information Analysis and Sharing

Develop an information management system to serve as the foundation for the analysis of data trends and the identification of potential safety hazards before accidents occur.

2009: Evaluate current protection and assurance models and potential conflicts with privacy and consumer advocacy groups. (JPDO OI #69)[17] / (JPDO, Aviation Safety Risk Analysis)[/10]
2012: Validate the Net Enabled Operations (NEO) Architecture proof-of-concept for the sharing of aviation safety information among JPDO member agencies. (JPDO OI #69) / (Aviation Safety Risk Analysis)[/10]
2013: Complete the NGATS Aviation Safety Information Analysis and Sharing (ASIAS) Phase 1 pre-implementation activities, including concept definition. (JPDO OI #69) / (JPDO, Aviation Safety Risk Analysis)[/10]

Develop a system to increase safety of commercial operations.

2011: Develop automated tools to monitor databases for potential safety issues. (Aviation Safety Risk Analysis)
2012: Demonstrate a working prototype of network based integration of information extracted from diverse, distributed sources. (Aviation Safety Risk Analysis)

Safety Management System

Produce guidelines for developing processes and technologies to implement a safety management system.

2011: Develop proof of concept for NextGen including a prototype to implement on a trial basis with selected participants that involve a cross-section of air service providers. (JPDO OI #71, 72, 73) / (Aviation Safety Risk Analysis)[/10]
2011: Complete study of risk-based fleet management for small-airplane continued operational safety. (JPDO OI #68) (Aging Aircraft)
2012: Develop risk management concepts, models, and tools for unmanned aircraft systems. (JPDO OI #68) (Unmanned Aircraft Systems Research)
2012: Develop risk management concepts, models, and tools for transport category airplanes. (JPDO OI #68) (Aviation Safety Risk Analysis)
2014: Demonstrate a National Level System Safety Assessment capability that will proactively identify emerging risk across the NextGen. (JPDO OI #71, 72, 73)/ (JPDO, Aviation Safety Risk Analysis)[/10]

Safety evaluation

Develop method and metrics to measure progress in reducing the rate of fatalities and significant injuries by two-thirds.[18]
(Aviation Safety Risk Analysis)

2010: Demonstrate a one-third reduction in the rate of fatalities and injuries.
2012: Demonstrate a one-half reduction in the rate of fatalities and injuries.
2015: Demonstrate a two-thirds reduction in the rate of fatalities and injuries.

Capacity evaluation

Develop method, metrics, and models to demonstrate that the system can handle growth in demand up to three times current levels.[19]
(JPDO, CAASD, Operations Concept Validation,[/12] System Capacity Planning and Improvement, Airspace Management Laboratory, Airspace Redesign)

2008: Demonstrate capacity increase to 130% current levels.
2010: Demonstrate capacity increase to 166% current levels.
2012: Demonstrate capacity increase to 230% current levels.
2015: Demonstrate capacity increase to 300% current levels.

Environmental evaluation

Develop method, metrics, and models to demonstrate that aviation noise and emissions can be significantly reduced in absolute terms to enable the air traffic system to handle growth in demand up to three times current levels.[20]
(Environment and Energy,[/11] JPDO, CAASD, Operations Concept Validation)

2008: Demonstrate no environmental restrictions at 130% capacity.
2010: Demonstrate no environmental restrictions at 166% capacity.
2012: Demonstrate no environmental restrictions at 230% capacity.
2015: Demonstrate no environmental restrictions at 300% capacity.

[17] Operational Improvement numbers are from the draft JPDO release on June 2006.
[18] This supports demonstration of the 2015 milestone under the human protection goal.
[19] This supports demonstration of the 2015 milestone under the fast, flexible, and efficient goal.
[20] This supports demonstration of the 2015 milestone under the clean and quiet goal as it applies to the 2015 milestone under the fast, flexible, and efficient goal.

Human Systems
integration division

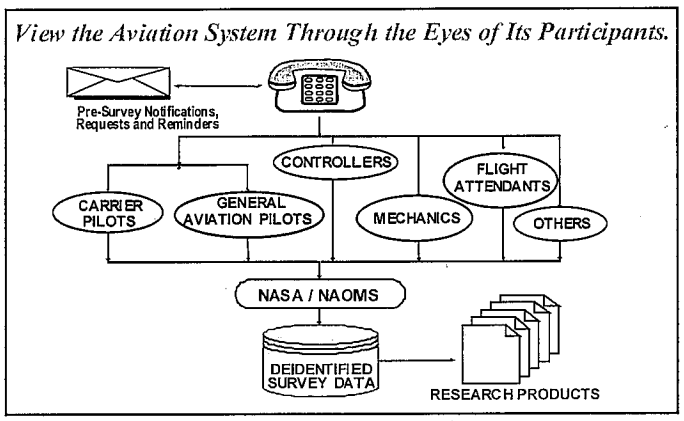
National Aviation Operational Monitoring Service (NAOMS)

Objective

NAOMS is an element of the ASMM Project whose purpose is to:

1. Create a mechanism to routinely measure the safety of the National Aviation System (NAS) in a quantitatively precise way.

2. Demonstrate the use of this mechanism to assess trends in NAS safety and to identify the factors driving those trends.



3. Identify safety and efficiency effects of new flight and Air Traffic Management (ATM)

Approach

Provide a comprehensive, statistically-based system-wide survey mechanism for monitoring the performance and safety of the overall NAS and for detecting and evaluating the effects of new technologies or procedures as they are inserted into the system. A new constituency (commercial flight crews, GA pilots, ATC controllers, technicians, flight attendants, etc.) is added to the survey each year as it ramps up to representations from all of the stakeholders.

Impact

NAOMS provides an ability to support the aviation community in its assessment of operational safety risks and of the efficacy of government/industry interventions. The NAOMS Team has, therefore, cultivated close associations with representatives of all of the stakeholders in the aviation community.

Information Technology

NAOMS has devoted a great deal of energy to developing a methodologically sound survey process. Trade offs have been considered among precision, accuracy, and cost. The main variable that can be manipulated to accomplish these tradeoffs is sample size. A very successful Field Trial of NAOMS in FY99-00 helped to quantify those trades. It also helped to establish several other features of the methodology to ensure stability and interpretability of the statistical trends. Advanced statistical methods are utilized to process the data and extract the information automatically.

POC: Mary Connors, Ph.D.

URL: http://humansystems.arc.nasa.gov/

2003-01-2975

NASA's Aviation System Monitoring and Modeling Project

Irving C. Statler and David A. Maluf
NASA Ames Research Center, Moffett Field, CA

ABSTRACT

Within NASA's Aviation Safety Program, the Aviation System Monitoring and Modeling (ASMM) Project addresses the need to provide decision makers with the tools to identify and evaluate predisposing conditions that could lead to accidents. This Project is developing a set of automated tools to facilitate efficient, comprehensive, and accurate analyses of data collected in large, heterogeneous databases throughout the National Aviation System. This report is a brief overview of the ASMM Project as an introduction to the rest of the presentations in this session on one of its key elements---the Performance Data Analysis and Reporting System (PDARS).

INTRODUCTION

Air transportation is essential to continued economic development of the world. Although it is one of the safest modes of travel, the public demands that safety levels continuously improve and that the absolute number of aviation accidents continue to decline, even as air traffic levels increase. There is a recognized need throughout the international aviation community to become even more proactive in managing safety risk as evidenced by the following statement made by the FAA Administrator, Marion Blakely at the North American Safety Conference earlier this year *"For one, we need to change one of the biggest historical characteristics of aviation safety improvements --- our reactive nature. We must get in front of accidents...anticipate them...and use hard data to detect problems and disturbing trends."*

A proactive approach to identifying and alleviating life-threatening conditions involves monitoring the system performance in a non-punitive environment, learning from normal operational experience, identifying the precursors that foreshadow most accidents, and designing appropriate interventions to minimize the risk of their occurrence. Decision-makers must be able to focus quickly on those events with the highest potential severity and likelihood of reoccurrence.

The governments and the world aviation community routinely amass large quantities of data that could be sources of information relevant to aviation safety. Increasingly, the accumulation of these data outpaces the community's ability to put them to practical use. Often safety data cannot be retrieved after they have been put into computerized storage because of the way that the data were categorized. It is difficult to combine data related to the same subject when they come from diverse, heterogeneous sources. The ability to monitor continuously, convert the collected data into reliable information, and share that information for collaborative decision making is the basis for a proactive approach to identifying and alleviating life-threatening aviation conditions and events.

THE AVIATION SYSTEM MONITORING AND MODELING PROJECT

The Aviation System Monitoring and Modeling (ASMM) project of NASA's Aviation Safety Program, addresses the need to provide decision makers with tools to assist them in identifying and correcting the predisposing conditions that could lead to accidents. (Ref. 4)

ASMM does not aim to replace human expertise with automation. Rather, it provides computational tools to minimize demands on human experts and to focus their attention on the most significant events, and help them identify the factors that distinguish unsafe operations from routine flights. It has developed tools to do tasks that presently can only be performed with much time and effort by aviation experts. The ASMM tools convert a bounty of raw aviation data drawn from many sources—aircraft flight data recorders, ATC radar tracks, maintenance logs, weather records, aviation safety incident reports, etc—into meaningful information, vividly displayed. The focus of the ASMM project is on identifying precursor conditions that elevate the probability of downstream human errors that may, in turn, contribute to aviation safety incidents or accidents.

Each of the several ASMM tools contributes to a unique insight into the complete picture of a safety event, and can be used to support a complementary and synergistic process of causal analysis and safety risk assessment from a system-wide perspective. Qualitative data sources yield information that helps the analyst understand the subjective aspects of "why" an incident occurred, while quantitative data sources help the

analyst to understand the objective aspects of "what" happened.

MONITOR TO IDENTIFY SAFETY-RELATED EVENTS:

The first step in the proactive management of risk is to monitor the system continuously, and collect, codify, and classify safety incident data into repositories that can be subsequently mined for safety insights. The databases containing information relevant to aviation safety are very large, heterogeneous (textual and digital), diverse, distributed sources from which information must be extracted and merged to gain a complete picture of a situation. The information must be displayed in a way that makes it easy for the domain expert to interpret and to compare with expectations or performance standards., and to gain the insight needed to identify those events that present potential risks.

Some of the databases, such as the Aviation Safety Reporting System (ASRS) and National Transportation Safety Board (NTSB) databases deal with the national aviation system. Others archive data applicable to particular groups of users. Accordingly, the ASMM uses a dual monitoring strategy. It develops tools that help identify system-wide safety trends using existing and evolving system-level data resources (*extramural monitoring*), and it provides individual constituents of the NAS with tools that enable them to draw useful information from the data they gather (*intramural monitoring*).

Intramural Monitoring

The *Intramural Monitoring* element is intended to provide the air-service operators with the tools needed to monitor their own performance and safety continuously, effectively, and economically within their own organizations. The primary products of this activity are the Aviation Performance Measuring System (APMS) for processing flight-recorded data and the Performance Data Analysis and Reporting System (PDARS) for processing air traffic control data. The intent is to provide a suite of tools for converting data into information customized to the needs of each individual user, and, thereby, to encourage them to share their information for cooperative proactive decision making.

Intramural monitoring at the air carriers is addressed with the APMS that is the research to develop the methodologies and tools to demonstrate to US air carriers that very large quantities of flight-recorded data can be monitored, processed, and analyzed routinely, efficiently, economically, and usefully. The suite of integrated APMS tools is designed to convert flight-recorded data into information to the air-services provider for assuring the quality, reliability, and safety of performance of each company's own Flight Operations and Quality Assurance (FOQA) programs and Advanced Qualifications Programs (AQP). (Ref. 1 and 2) APMS tools go substantially beyond the capabilities of the current commercially available software programs that are mainly designed to count pre-defined exceedances. The APMS will assist an operator in understanding how its aircraft are being operated normally and routinely on the line. The flight-safety analyst will be able to identify atypical, statistically extreme, and safety-related events and trends to support safety and economic decisions.

Intramural monitoring at air traffic control is addressed with the NASA-FAA Performance Data Analysis and Reporting System (PDARS). PDARS is an ATC radar-track monitoring capability developed by NASA and the FAA that routinely collects, processes, and merges ATC data; computes quantitative performance measures; produces and disseminates daily performance-measurement reports, and archives basic operational data and performance statistics. PDARS performance measurements relate to system throughput, delays, system predictability, and other key ATC performance indicators. (Ref. 3) This project is being carried out in collaboration with the ATC community (FAA and NATCA) to obtain the users' evaluations and the identified informational needs of air traffic management.

Currently, the ATC facilities in three of the nine FAA-ATC regions plus the Command Control Center are participating in the test and evaluation of PDARS. This constitutes about thirty facilities connected to the PDARS network and receiving reports each morning about the previous day's operations that are customized to the needs of each facility. By agreement among the facilities, these reports are shared.

NASA is responsible for the implementation and maintenance of the secure, dedicated network over which PDARS reports are distributed and shared among facilities. The PDARS network provides for collecting data from each ATC site, transmitting them to the central site for processing, and delivering the results of the processed data to ATC managers at each of the sites for evaluation. (Figure 1).

The functional requirements of the FAA customers on PDARSnet focus on the need to maintain a secure and reliable path to each of the data centers, while maintaining the flexibility for future upgrades and additional sites. PDARSnet includes a two-tiered approach: the physical/logical connectivity between sites and the security mechanisms required by the proprietary nature of the ATC data. The PDARS wide-area network (WAN) connectivity requirements are met with Cisco 2524/2621 routers at each location on multiple frame relay cloud. The Frame Relay technology is a reliable cost-effective solution that also offers the benefit of logical point-to-point connectivity and bandwidth upgrades without the need to install additional equipment. PDARSnet has a Committed Information Rate (CIR) of 384 kilobytes/second between remote sites and the central processing site, guarantees availability of service at 99.8%, and maximum time to restore service is no more than 4 hours.

Security is a prime concern for this network. Therefore, many precautions are taken to ensure data confidentiality. These include the physical and logical isolation of this network from all other networks (including the internet), central management of WAN security policies and procedures, and strict enforcement of access from site LAN to PDARSnet resources. Data flow is subjected to security filters that (1) are implemented on the leaf site routers, (2) operate on source and destination addresses, and (3) act as access lists to allow only approved customer networks to traverse the PDARSnet.

At each FAA site, NASA provides, operates, and maintains the router to tap into the PDARSnet. One LAN access port is provided for each leaf site. The router password is restricted to PDARS operations. The demarcation of responsibility for the PDARSnet is at the LAN port on the router at the local site. FAA is responsible for all resolutions that extend beyond this demarcation within the site.

The PDARSnet is currently a full production network connecting about thirty sites and is expanding.

Extramural Monitoring

The *Extramural Monitoring* element complements *Intramural Monitoring* and provides a comprehensive mechanism for monitoring the performance and safety of the overall National Aviation System and for detecting and evaluating the effects of new technologies as they are inserted into the system. *Extramural Monitoring* is the "top-down" element of the dual strategy for monitoring. The primary product of this activity is the National Aviation System Operational Monitoring Service (NAOMS).

NAOMS is a comprehensive and coherent survey of the operators of the aviation system (i.e., its pilots, controllers, mechanics, dispatchers, flight attendants, and others) on a regular basis. There is proven value in viewing the aviation system through the eyes of its operators. NAOMS is a longitudinal survey that will track safety trends, monitor the impact of technological and procedural changes to the NAS, and contribute to the development of a data-driven basis for safety decisions.

The concepts and capabilities of the two approaches (i.e., top-down extramural monitoring and bottom-up intramural monitoring) have evolved independently in parallel. However, information derived from each will complement the other as well as the other elements of ASMM in the process of identifying precursors, monitoring the effects of changes, and developing predictive capability.

EVALUATE THE OPERATIONAL SIGNIFICANCE

The second step in the cycle of proactive management of risk is to evaluate the operational significance of the incident or event that was identified. Decision-makers must be able to focus quickly on those events with the highest potential for severe consequences and likelihood of reoccurrence. This evaluation requires an understanding of the contextual factors and conditions that were conducive to the identified incident so that the domain expert can ascertain the likelihood of future occurrences and assess the severity of potential consequences.

The element of the ASMM Project called *Data Analysis Tools Development* is developing a set of automated tools to facilitate efficient, comprehensive, and accurate analyses of data collected from large, heterogeneous data sources throughout the National Aviation System. These new technologies extract information from and establish meaningful linkages among both qualitative (i.e., textual) and quantitative (i.e., digital) databases, and provide visualizations of significant patterns and trends.

Information must be extracted from qualitative data sources to help the domain expert understand the subjective aspects of "why" an incident occurred, and from quantitative data sources to understand the objective aspects of "what" happened. Therefore, automated capabilities are being developed to process both textual and numeric aviation data, and to extract relevant information from diverse databases; including those derived from the activities under *Intramural* and *Extramural Monitoring*. The results of the searches of heterogeneous databases are presented in displays of meaningful information that help the analysts achieve the insight needed to understand the circumstances, focus their attention on operationally significant events, and propose mitigating actions.

Each of the tools developed are being tested and evaluated by our partners in the operational environment under *Intramural* and *Extramural Monitoring.*

The work being carried out under the element called *Modeling and Simulations* is described in the next section as it relates to the formulation of an intervention. However, fast-time simulations are also used to **Evaluate** an identified event by helping the analyst explore for its contextual factors that are conducive to failure and human error, gain insight into the operational significance of the event, and assess its potential consequences.

FORMULATE AN INTERVENTION

Having identified an operationally significant event and understood its contextual factors, the next step in the process of proactive management of risk is to formulate an intervention. It is up to the experts in industry and the FAA to **Formulate** and to **Implement** the interventions. However, an objective of the element of ASMM called *Modeling and Simulations* is to aid the decision makers in these two steps of the process.

Modeling and Simulations uses models of the NAS at a level of detail sufficient to track key safety characteristics for reliable prediction of the system-wide effects of new technologies and procedures on operations and communications. Models incorporate human performance into existing NAS modeling tools and are being validated with data obtained from *Intramural* and *Extramural Monitoring*. Techniques have been developed for representing multi-operators interacting in complex dynamic scenarios.

Fast-time simulations serve as a computational test bed for analyzing system performance, including the contributions of individual operators, individual elements of the system, the interactions among multiple agents, technologies, and large-scale system flow and control issues. Fast-time system-wide simulations enable the safety analyst to answer questions like *"Does the solution have any secondary, propagated or side effects?"* and *"Does the solution provide for graceful degradation in unanticipated operation anomalies?"* and *"Does the proposed intervention address the right question and in the right way based on an understanding of the joint cognitive system?"*

The assessment of safety risk is currently a post hoc analysis by the human expert of the statistical results of the fast-time Monte Carlo simulations. However, analytical tools are being developed in parallel with the fast-time simulations to assist the analysts in identifying the significant contextual factors of an event and in assessing the safety risks.

IMPLEMENT THE INTERVENTION

Implementation of an intervention for an identified problem is accomplished via prototypes, their effectiveness is evaluated, refinements are implemented, and then full-scale deployments are facilitated.

The step that is often missing from the cycle of proactive management of risk is that of having in place a system for monitoring in order to assess the effectiveness of the intervention measured against expectations. This is comparable to the first step in the proactive-management process called **Monitor to Identify** and closes the loop on the cycle. This step requires that those data that are needed to evaluate the intervention are appropriately collected, codified, and classified for retrospective search. The monitoring system should have been in place before the intervention to gather the baseline data for comparison of the before to the after. Once again, the relevant information in large heterogeneous, distributed databases need to be merged to gain a complete picture of the system-wide situation. All of the ASMM tools are applicable to facilitate efficient and insightful analyses of all relevant information.

IN SUM...

The ability to monitor continuously, convert the collected data into reliable information, and share that information among the stakeholders for collaborative decision making is the basis for a revolutionary, proactive approach to managing the aviation system for prevention of accidents.

The four sub-elements of ASMM (*Extramural Monitoring, Intramural Monitoring, Data Analysis Tools Development,* and *Modeling and Simulations*) are interdependent and interrelated. ASMM will merge the products of these four elements into a system-wide frame work enabling collaboration in aviation safety-risk management by policy makers whether they are in government or industry by sharing information while respecting the proprietary rights to some sources of data and sensitivities to potential misuse should they be released outside the owning organization.

Each of the ASMM Products such as APMS, PDARS, and NAOMS has stand-alone capabilities that will continue to evolve as the Data Analysis Tools are adapted to meet the evolving needs of the constituencies. However, the true and overriding value of the ASMM Products is as an integrated suite of tools to enable the achievement of a system-wide perspective on proactive management of the safety risk of the NAS.

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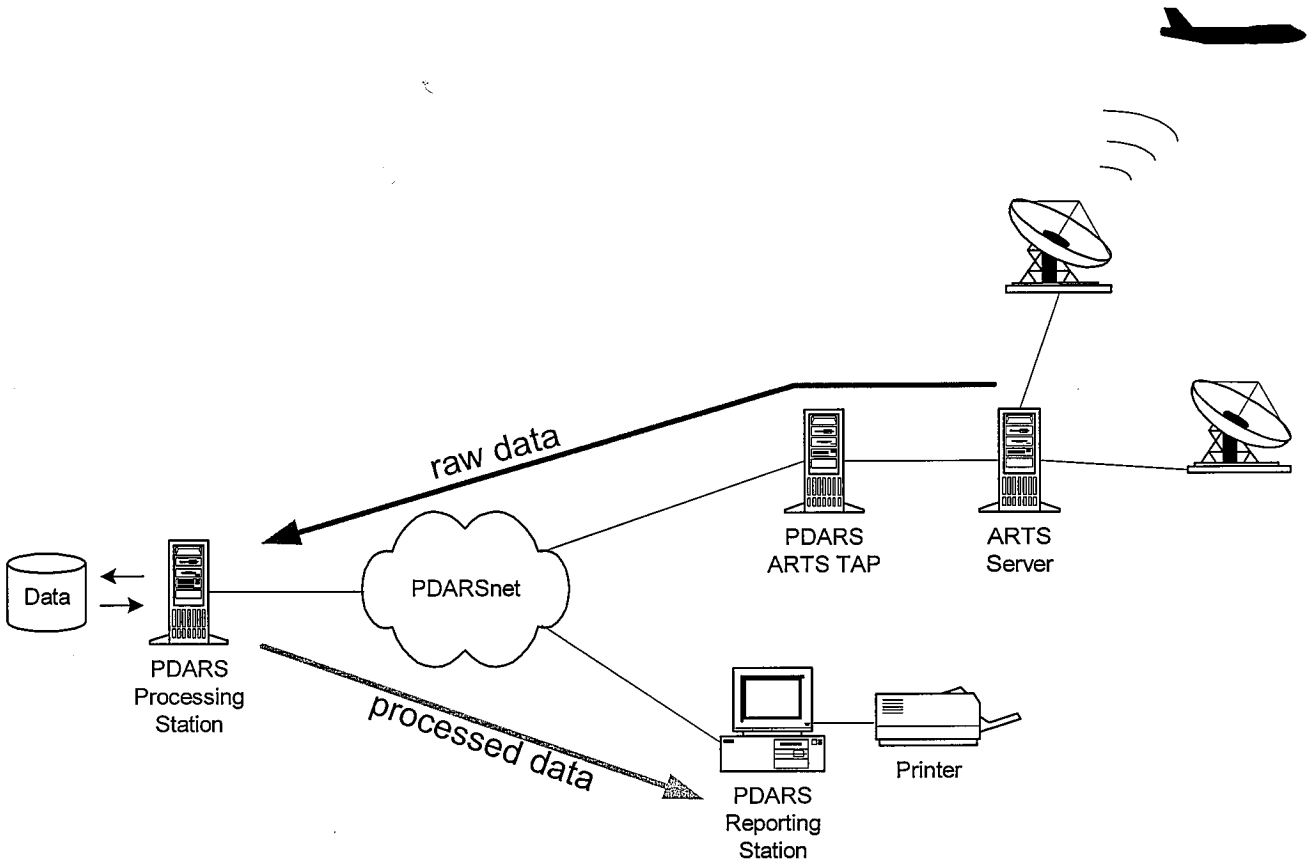

Figure 1 – PDARSnet Application Data Flow

Los Angeles Times

PART-A; Metro Desk

Danger on the Ground, Too Safety: Near-misses have occured on runways and taxiways, federal records show. Pilots were sometimes lost or controllers moved planes into another's path.

WILLIAM C. REMPEL; DAVID FREED
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While the crowded skies above Los Angeles International Airport have been recognized as among the most hazardous in the nation, it is on the ground-in the airport's maze of runways and taxiways-where many accidents and harrowing near-misses have occurred in recent years, records show.

In June, 1989, a jetliner taxied onto Runway 25-Right for takeoff at the same time another jetliner was preparing to land on the same runway. The landing plane, which apparently was coming in on the wrong runway, aborted its approach to avoid a collision.

On other occasions, pilots have become lost on taxiways at the Los Angeles airport, strayed onto active runways and have landed or completed takeoffs while narrowly missing other aircraft on the runways, according to pilot and controller reports filed with the National Aeronautics and Space Administration and reviewed Saturday by The Times.

Officials of the National Transportation Safety Board have warned repeatedly that ground accidents at busy U.S. airports, including in Los Angeles, pose a "high potential for catastrophe," and they have placed a high priority on improving ground safety.

After the fatal collision Friday night between an arriving USAir jetliner and a departing SkyWest commuter plane, local pilots and others contended that, given the number of less-serious ground accidents and near-misses that preceded it, this catastrophe was only a matter of time.

No one had died in a commercial aviation accident at the airport since 1978, when a Honolulu-bound Continental Airlines DC-10 blew two tires and made an emergency landing after aborting takeoff. Three people were killed.

A handful of other instances have occurred more recently in which planes slammed or slid into each other while taxiing, but no one has been seriously injured.

The world's worst aviation accident occurred on a runway in the Canary Islands in 1977, when two Boeing jumbo jets collided in fog, killing 583.

From the air, Los Angeles International is a relatively simple airport-two parallel sets of runways separated by the bulk of the airport's passenger terminals.

But trying to safely place airplanes in sequence as they land and take off on those same runways can be a nightmare, particularly at peak hours such as Friday evening, air traffic controllers say.

All manner of aircraft, big and small, fast and slow, fly in and out of the Los Angeles airport. Coordinating them requires that controllers gauge how long it will take a departing plane to leave a runway to avoid another plane that may be coming in seconds behind it.

The potential for accidents, experts say, may be compounded by the fact that Los Angeles ground controllers do not always direct pilots to taxi to the ends of runways before taking off. Pilots of smaller planes, whose aircraft generally need less distance to get off the ground than larger jetliners, frequently are cleared for takeoff from runway intersections.

It was from such an intersection that the departing SkyWest plane turned onto Runway 24-Left, where it was struck by USAir's incoming Flight 1493.

"That airport is known for this kind of problem," said John Galipault, president of Aviation Safety Institute in Worthington, Ohio. "It's an extremely busy airport, making it very favorable for aircraft to get out onto runways where they shouldn't be."

Last April, a report prepared by the Air Line Pilots Assn. concluded that the airspace around Los Angeles International Airport was among the seven most dangerous flight areas in the United States.

Pilots have found that being on the ground can be no less threatening.

The NASA reports, copies of which were recently obtained under the U.S. **Freedom of Information** Act, show that in January, 1986, a passenger jet barely missed a small private plane that was awaiting takeoff instructions on the threshold of Runway 25-Right. The jetliner's visibility was hampered by an early morning haze, but it was an apparent air traffic controller's error that put both aircraft on the same runway at the same time.

"I phoned the LAX tower and was told that the light plane apparently had been cleared into position (for takeoff), and then they (controllers) had forgotten him," wrote one of the jetliner crew members in his incident report.

In a December, 1987, incident, another disaster was narrowly averted when one pilot decided to extricate himself from taxiway gridlock-and steered into the path of an oncoming jet taking off.

"There were perhaps eight to 10 jets within a 1,000-foot radius of us at this time," the pilot reported. "It appeared we were in a gridlock with no place to go except a taxiway to my left which I believed to be the outer taxiway."

It was not a taxiway but an active runway. To make matters worse, communication with ground controllers was all but impossible because radio frequencies were swamped.

"To help her (the controller) out with her extremely busy workload, I took the initiative to take the turn to the left leading me back to what I thought was the outer parallel but was in fact the runway," the pilot reported. "Simultaneously, we saw aircraft lights facing us."

The pilot hastily turned into a green Tarmac area-safely off the runway-as the other jetliner roared into the night sky.

Only a few days later, another pilot reported taking off over the tail of a wide-body jet that he discovered was jutting out into the runway. The discovery was made too late to abort the takeoff, but as he lifted off the pilot veered left to increase his clearance.

"Had we lost No. 2 engine or blown a tire during takeoff roll, we might have struck that aircraft," the pilot noted in his NASA report. "In our estimation, the tower should have had the wide-body taxi farther off the runway before clearing us for takeoff."

The NASA files are part of the FAA's **safety reporting** system. Air traffic controllers and crew members file the reports voluntarily and, in so doing, can receive immunity from administrative actions against their Federal Aviation Administration certificates.

The Times reviewed scores of NASA reports related to operations at Los Angeles International Airport and found numerous examples of hazardous situations created when pilots taxied across active runways without controller approval or mistakenly turned onto the wrong taxiways.

In one 1988 incident, a crew got lost after it was diverted to an unfamiliar part of the airport to wait for a plane parked at its ramp to depart. Wending their way back to the ramp through a maze of blue taxiway lights, crew members made at least two or three wrong turns until they encountered white lights: They were on an active runway.

"Crew immediately . . . expedited taxi to first exit," the pilot wrote.

Meanwhile, another jet that was descending had to pull up abruptly, missing the wayward aircraft by a scant 200 feet.

Times research assistant Maureen Lyons contributed to this story.

PHOTO: A firefighter walks around the tail section of the USAir Boeing 737 that collided with a SkyWest commuter plane on a runway. / MARSHA TRAEGER-GORMAN / Los Angeles Times

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Los Angeles Times

PART-A; National Desk

COLUMN ONE FAA's Safety Response Record Hits Turbulence Over the past decade, the agency has been slow to heed safety warnings-sometimes acting only after fatal crashes, according to a Times study. Series: DANGEROUS DELAYS. FAA's Response Record Under Fire. First in a series

JEFF BRAZIL
TIMES STAFF WRITER

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As USAir Flight 1493 prepared to touch down at Los Angeles International Airport on Feb. 1, 1991, passenger David Richman, a Harvard-educated college professor and proud new father, knew nothing about the potential danger of runway collisions. Nor did any of the other 33 people who were about to die that Friday evening.

But the Federal Aviation Administration did know.

As far back as 1983, records show, air safety experts had urged FAA action to do more to prevent runway accidents. Even within the agency, officials had prodded their superiors to expedite ground-based radar systems and relatively inexpensive traffic lighting systems.

The FAA did take those actions and more-but only after Flight 1493 suddenly landed atop a Skywest commuter plane, killing 34 people. This was the third fatal runway collision in the United States in 13 months.

"How many crashes do you need?" asked Barry M. Sweedler, director of safety recommendations for the National Transportation Safety Board. "If you have one, there should never be another one with the same problem. Why do we need two, three, four or five?"

In dozens of instances over the past decade, the FAA has taken two years or more to respond to repeated warnings of air safety problems, and the agency often has acted only after loss of life, according to a four-month study by The Times.

The FAA, the federal agency responsible by law for ensuring air safety, has been named by the NTSB as a cause or factor in 103 airplane accidents and incidents between 1983 and last July that together killed 574 and injured 421.

And records also show that hundreds more people have died in crashes caused by problems to which the FAA had been alerted but failed to act.

In addition to runway collisions, these problems included turbulence caused by the wings of Boeing 757 jetliners, procedures for de-icing wings before takeoff, the refurbishment of aging aircraft, passenger access to emergency exits and the installation of devices that warn if a plane is flying too low.

Although he said safety is the agency's "No. 1 job," David Hinson, the administrator of the FAA, said of the list of lapses: "I think you've put your finger on something that we're really trying to deal with."

While Hinson was unfamiliar with the specific areas The Times was focusing on-most of which preceded his arrival in 1993-he said: "Hopefully, we'll be more responsible in quicker fashion."

FAA officials say the agency's day-to-day operation addresses most issues "rather effectively," often detecting and remedying safety problems before accidents occur. Each morning, they say, the agency deploys about 3,000 inspectors and runs the busiest airspace in the world-without major incident on most days.

"This is a formidable task," Hinson said.

The FAA "acknowledges that it can be reactive in some cases, but that can be a proper response in many cases," according to a statement by the agency in response to The Times.

"Reaction often means we insist on learning from past accidents. At other times, reaction may mean that we are properly responding to public demand or concern, which is proper in our democratic form of government."

Said Hinson: "If you look at the way the FAA deals with safety, about 95% of what we do . . . of what you or I would call preemptive safety efforts, those are efforts you probably never read about or write about.

"About 5% of what we do is after there is an incident or an accident."

Airplane manufacturers and airlines said safety comes first with both the FAA and them, and that they would never compromise the lives of the flying public. "We always want to try to make a good system better," said Joe Hopkins, spokesman for United Airlines.

A scheduled commercial airplane trip in the United States is regarded as among the safest forms of travel in the world. The odds of an air traveler dying in a crash are roughly the same as the odds of being killed by lightning, according to the National Safety Council.

The U.S airline industry had gone more than two years without a major accident before the string of fatal accidents this year. As of October, an estimated 843 people have died in plane crashes in 1994-one of the worst records since 1988, according to preliminary statistics by the NTSB, the agency that investigates accidents.

Now, NTSB sources say, investigators are exploring whether deficiencies in FAA oversight and operations may have been contributing factors in at least two of the three major accidents this year in Charlotte, N.C., Pittsburgh, Pa., and near Chicago.

After the FAA admitted in July that it may have mishandled reports on turbulence problems associated with Boeing 757 jetliners, The Times reviewed hundreds of airline crashes and thousands of government documents obtained under the **Freedom of Information** Act. Scores of past and present FAA officials, members of Congress, airline industry sources and safety experts were interviewed.

What emerged was a portrait of an agency that many times has been slow to address safety problems, particularly when they were controversial or costly to correct. Among the findings:

* The FAA's performance sometimes has been compromised by poor communication between those charged with identifying potential safety problems and those with the power to act on them, and pressure from an influential industry.

"Any time you want to change the rules, the manufacturers scream," said one FAA aircraft-certification official who spoke on condition of anonymity. "Anything that cost money to the manufacturers, we have to fight them on. They say: `Well, there hasn't been an accident.' We say: `Well, there could be.' "

* Deadly delays have occurred in part because a law requires the FAA to justify the cost of implementing proposed safety measures by showing that enough lives will be saved.

"It's strangulation of safety by regulatory process," observed Rep. James L. Oberstar (D-Minn.), chairman of the House Public Works and Transportation Committee's panel on aviation.

* The FAA failed to heed repeated admonitions from oversight agencies and from within its own ranks to make safety a higher priority. And there exists, both inside and outside the FAA, a tacit acceptance that sometimes only accidents can spur the agency to take meaningful action.

Charles O. Miller, former head of the NTSB's Bureau of Air Safety, said he has kept a file called "known precedents."

"I have been keeping it for awhile because I was getting disturbed about seeing accidents happen from causes I had seen before," he said.

Consider the case of runway safety.

nation's busiest airports has fallen behind schedule and may not be completed until the turn of the century, according to the General Accounting Office.

"Something simmers on the back burner, and it doesn't get done," said Hugh E. Waterman, a former FAA manager who worked for the agency for 27 years before retiring in 1986. "But then, one governor or 60 regular human beings dies, then it goes onto the front burner."

*

Created in 1958, the FAA has a double-barreled task that critics believe is a conflicting one: to promote the aviation industry and to ensure safety.

The NTSB is charged with investigating the causes of transportation accidents and making safety recommendations. Created in 1974, it has no regulatory powers and cannot force the FAA to act. Historically, the NTSB has wielded its influence most successfully by publicly drawing attention to the FAA's lapses and leveraging legislative outrage.

The FAA points out that through the years it has identified numerous safety hazards and acted before accidents ever occurred. In a 20-page statement to The Times, FAA officials said the agency routinely detects safety problems but receives no credit because there is no way to tell how many accidents have been prevented.

"Airline safety is among the least recognized success stories in public or corporate policy in the United States," the FAA statement said. "Improvements in engine reliability, aircraft design, avionics, cockpit technology, navigational aids and air traffic control have made serious accidents rare events."

Although the FAA has adopted eight of every 10 safety recommendations made by the NTSB, the average amount of time it takes to implement the recommendations is slightly more than two years. In some cases, it's been much longer.

While he believes that the NTSB functions as a "great auditor" for the FAA, Hinson said the FAA sometimes respectfully disagrees with the safety board, and with good reason.

"I think it's probably OK to have disagreement on the 15% or so," Hinson said, referring to the number of safety recommendations the agency doesn't accept. "It's not just . . . `We don't like them' and put them away. We have to defend our position.

"There are often cases in aviation where knowledgeable people can disagree."

The NTSB's Sweedler said the safety board was pleased with the "82.5% acceptance rate," but, he said, "there are quite a few important issues in the other 18%."

*

Records show a pattern of delay in correcting a number of problems:

* It took the FAA eight years to act on a problem with Cessna carburetors after John R. James, manager of the FAA's aircraft certification office in Atlanta, had written a memo warning: "CAUTION: there have been reports of power loss, severe in some cases."

The problem was causing planes to stall and crash. During that eight-year period, at least 10 accidents had occurred and half a dozen people had died.

* A year before the top half of a Boeing 737 ripped off over Hawaii in 1988 because of metal fatigue, FAA researcher Thomas Swift wrote a 77-page report saying fatigue in America's aging air fleet was a safety risk: "It is possible for a number of cracks, each not easily inspected, to suddenly join together and form a long critical crack. . . . A number of fleets are currently operating at double their initially anticipated design life goals."

* It took a decade of admonitions and at least four major crashes before the FAA acknowledged that certain planes, such as early model DC-9s and Fokker F-28s, were especially susceptible to control problems with minute amounts of ice on their wings.

Ten years after the NTSB had made safety recommendations following the deaths of 78 people in a 1982 Air Florida accident in Washington, a similar tragedy happened at La Guardia Airport in New York. That accident, involving USAir Flight 405, killed 27.

In 1978, two researchers, using statistics compiled by the National Aeronautics and Space Administration's Aviation **Safety Reporting** System, issued a report that said "incursions by aircraft on the runways of controlled airports represent a significant safety hazard."

Between 1978 and 1983, at least three near-collisions involving major jetliners occurred on U.S. runways.

In 1985, after two Northwest Airlines DC-10s were involved in what the NTSB termed a "potentially disastrous" incident in Minneapolis, the safety board urged the FAA to expedite projects designed to prevent collisions.

For years the FAA had such projects in the works, including the development of ground-based radar systems to help air traffic controllers track airplanes on the tarmac and simple lighting systems to ensure that departing planes do not stray onto active runways, especially during inclement weather.

Even within the FAA, officials recognized that progress had been too slow.

An internal FAA memorandum sent to air traffic managers in 1986 acknowledged that the runway incursion threat required further action. It noted that many FAA projects designed to deal with the problem were incomplete and, even if finished, would have questionable efficacy.

That year the NTSB released the results of a special investigation on runway incursions, proffering to the FAA 33 recommendations designed to prevent them. One recommendation originally had been issued 13 years earlier, but was never acted upon.

During the next four years, according to internal FAA documents, the agency received dispatches from many corners of the industry, urging it to take preventive measures.

Oct. 27, 1987: John O'Brien, director of engineering and air safety for the Air Line Pilots Assn., said in a letter to FAA Associate Administrator Anthony Broderick: "Several accidents and incidents over the last few years have documented the seriousness of runway incursions."

Aug. 11, 1989: An internal FAA memorandum declared: "The Air Traffic Operations Service has stated an immediate need for a runway incursion alert system. . . . We agree that the potential for a runway accident is a national concern."

But that concern turned to catastrophe.

The first of three fatal runway incursions occurred in Atlanta on Jan. 18, 1990, followed by one in Detroit on Dec. 3, 1990, and then the Los Angeles crash in February, 1991. The death toll for the three crashes: 47 people, including David Richman, the college professor.

"The world changed at that moment," said Richman's father, Alex, a psychiatrist and professor in Nova Scotia. "On that . . . morning, we were ignorant. We thought we could trust the airlines and the government. We thought safety came first."

After the Atlanta crash, which killed one man, the FAA mustered action teams to survey airports and identify potential problem areas. It also released a report in April, 1990, emphasizing that pilots could help cut runway incursions by being more aware of surrounding aircraft.

At the time, the agency also acknowledged: "FAA has not always coordinated its efforts to reduce incursions."

Still, it was not until after the Los Angeles crash that the agency placed more emphasis and money into its long-extant runway-incursion project.

By then, according to the FAA's own estimate, 11 runway accidents had occurred in the United States since 1970, resulting in 644 deaths and injuries, not including the casualties from the Atlanta, Los Angeles and Detroit crashes.

"I'm not a great fan of how fast we get things done in this organization," said the FAA's Michael J. Harrison, who spearheaded the runway collision prevention program after the crash of USAir Flight 1493. "Should the runway-incursion stuff have been done sooner? The answer to that is: of course."

Since that time, the agency's plan to develop a sophisticated ground-based radar system and place it at the

R esearched by JEFF BRAZIL and SHELBY GRAD / Los Angeles Times

How the Study Was Conducted

To complete this report, The Times reviewed roughly 20,000 pages of internal documents obtained from the Federal Aviation Administration through the **Freedom of Information** Act. The newspaper also reviewed a computer analysis of the causes of airplane crashes between 1983 and last July by the National Transportation Safety Board. The Times also studied dozens of reports by government oversight agencies, and interviewed scores of present and past FAA officials, airline industry sources, aviation safety experts, members of Congress, crash survivors and the families of crash victims.

PHOTO: COLOR, (Orange County Edition, A1) This USAir jet hit a commuter plane at LAX in 1991, killing 34 people, before runway safety was upgraded.; PHOTO: Investigators survey wreckage of USAir Boeing 737 the morning after the Feb. 1, 1991, deadly collision with a Skywest Metro plane at LAX. / MARSHA TREAGER GORMAN / Los Angeles Times; PHOTO: Alex Richman, father of David Richman, a victim of the runway crash of a jet in Los Angeles in 1991, says, "We thought safety came first." / JAMIE FRANCIS / For The Times; PHOTO: (Orange County Edition, A30) Wreckage of USAir jet at LAX. Many aboard died of smoke inhalation, 5 years after the FAA was advised of emergency-exit access problems. / JIM MENDENHALL / Los Angeles Times; PHOTO: David Hinson, FAA administrator; CHART: Runway Incursions / Los Angeles Times

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The Air Line Pilots Assn. said in a letter to the FAA at the time: "The lack of an adequate response to (the NTSB's earlier) recommendation (on de-icing wings), which was made approximately 9 years ago, contributed to the accident involving USAir Flight 405."

"The FAA," said veteran air safety investigator Rudolf Kapustin, "makes it sound like: `Hey, we've got a brand-new problem here.' Well, a lot of times it's not a new problem. It's an old problem."

Kapustin, who has worked for the FAA and the NTSB, was the lead investigator in the 1982 Air Florida crash, which was caused, in part, by ice on the wings. "After the Fokker accident (at La Guardia Airport in 1992), the FAA convened this worldwide conference on de-icing. They said: `Now you've got to put a ladder up and touch (the wing to see if it has ice on it).' Well, Jesus, we knew that years ago."

The FAA itself concluded last July that its ability to act upon safety concerns in a timely manner was lacking. The agency had launched an internal investigation after The Times reported that it had mishandled the Boeing 757 turbulence issue.

But the acknowledgment came as no surprise to air safety experts.

In 1988, then-FAA Administrator Allan McArtor, in an internal memorandum, acknowledged that the agency lacked an internal clearinghouse for safety data, and that management of safety data within the agency was disorganized.

A July, 1988, Office of Technology Assessment report concluded: "More stringent safety standards usually follow a widely publicized airline accident and vocal public and congressional concern than from FAA initiatives."

And last year, Robert E. Machol, the FAA's chief scientist before retiring last summer, pointed out the agency's shortcomings. In a March, 1993, memo, he detailed how the Boeing 757 wake-turbulence problem was handled. Before two crashes that claimed 13 lives, Machol had predicted that turbulence created by the jetliners would cause a "major crash" if the FAA failed to take preventive measures.

"This is symptomatic of a bigger problem, which is that we react very slowly to things where maybe we ought to act more rapidly," Machol wrote. "We need to be more alert to safety questions."

Next: Why delays in response occur.

Times researcher Sheila A. Kern and correspondent Shelby Grad contributed to this report.

The FAA Factor in Crashes

The Federal Aviation Administration is listed as a cause or factor in 93 plane crashes from1983 to July, 1994. Injury and fatality records for the 93 crashes show:

* 576 dead

* 151 seriously injured

* 270 moderately injured

An additional 10 crashes were attributed to errors by specific FAA employees, resulting in:

* Seven dead

* Eight moderately injured

Source: National Transportation Safety Board

Researched by JEFF BRAZIL and SHELBY GRAD / Los Angeles Times

Ru nway Incursions

From 1990 to 1993, the number of aircraft runway collisions has declined by one-third despite an increase in air traffic: '93: 188 Source: Federal Aviation Administration